



08/726024.

# SPECIFICATION

Docket No. 0317MH-23513

CERTIFICATE OF EXPRESS MAIL	
EXPRESS MAIL NO. <u>PM 385697526 US</u>	
<i>I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" under 37 CFR § 1.10 on the date indicated below and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.</i>	
<u>10/4/96</u>	<u>Melathum</u>
Date of Deposit	Signature
<u>Oct 4, 1996</u>	

## TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN that I, **DANIEL A. HENDERSON**, have invented new and useful improvements in a

## METHOD AND APPARATUS FOR IMPROVED PAGING RECEIVER AND SYSTEM

of which the following is a specification:

47

770-101 A  
08/726024



BACKGROUND OF THE INVENTION

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13

1. Field of the Invention:

This invention relates in general to communications systems and in particular to communications systems which include paging devices.

2. Description of the Prior Art:

Numerous companies are attempting to improve the manner in which people communication over wireless systems. The present invention addresses many deficiencies in the prior art systems.

1                   **CROSS-REFERENCE TO RELATED APPLICATIONS**

2  
3           This Application claims the benefit of the filing date under 35 USC §§119 and/or  
4   120, and 37 CFR §§1.60 and 1.78 to the following U.S. and U.S. provisional patent  
5   applications, and is a continuation-in-part of the U.S. patent application:

6           1.     U.S. provisional patent application serial no. 60/005,029, filed on October  
7   6, 1995, entitled "Method and Apparatus for Improved Paging Receiver and System";  
8   and

9           2.     U.S. patent application serial no. 08/177,851, filed on January 5, 1994,  
10   entitled "Method and Apparatus for Enhancing the Efficient Communication of  
11   Information in an Alphanumeric Paging Network".  
12  
13

## SUMMARY OF THE INVENTION

The present application is directed to the following inventive concepts:

1. Voice Paging System and Device which utilizes CIP from an originating central office as textual identifying data and generates prestored audio alert prior to annunciation of a corresponding voice message from calling party. See **Figure 4a**. CID could be fax header as in **Figures 6a** and **6b**.

2. Alternate embodiment of the above where the entry of PIN is required to play back messages from a selected group of callers or for messages of confidential nature. See **Figure 4b**.

3. Alternate embodiment of the above where DTMF audio signals and voice message is received. The device has a DTMF tone decoder generates corresponding textual data record and decoded digits for display. A text to speech synthesis can be achieved prior to annunciation of message. In another embodiment, the received DTMF signals could be used to generate call back dial signals. See **Figure 4c**.

4. Alternate embodiment of the above where the CID data could be applied to text to speech unit to annunciate CID data prior to the received voice message. See **Figure 4d**.

5. Alternate embodiment where device has three modes of operation, namely, announce, silent and broadcast mode.

6. Alternate embodiment where device has sound input means to ack-back to caller. See **Figure 7b**. The sound input means is used to prestore voice response messages for ack-back which is an improvement over prior art. See **Figure 7a**.

## BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

**Figure 1a** shows the prior art stored voice paging receiver.

**Figure 1b** shows an improved stored voice paging receiver with a test-to-speech means and a display input/output means to annunciate and/or display caller identification data associated with a particular voice message received.

**Figure 1c** shows an improved stored voice paging receiver with a sound input means, a coincidence detector, a display output means, a detachable input means, and a DTMF tone decoder means.

**Figure 1d** shows an improved non-display autodialing type paging receiver with text to speech generator and DTMF tone decoder.

**Figure 2a** shows a block diagram of a paging system described herein that has a messaging center at the called party office.

**Figure 2b** shows a block diagram of a paging system described herein that has a messaging center such as a voice mail center at the telephone office.

**Figure 3a** shows the prior art method of transmitting a voice message to a stored voice paging receiver.

1           **Figure 3b** shows an improved method of transmitting a voice message to a  
2 - stored voice paging receiver along with caller identifying data according to one  
3 embodiment of the invention.  
4

5           **Figure 4a** is a flowchart of one embodiment of the invention in which caller id  
6 data is applied to a coincidence detector and display within a stored voice paging  
7 receiver to generate a prestored audio alert signal.  
8

9           **Figure 4b** is a flowchart of one embodiment of the invention in which caller id  
10 and additional data entered by the caller using DTMF entry is sent with a voice  
11 message to a stored voice paging receiver with a text to speech alerting means  
12 and/or display means.  
13

14           **Figure 4c** is a flowchart of one embodiment of the invention in which canned  
15 display alerts can be generated and improved dial signal generation can be employed  
16 in an improved stored voice pager.  
17

18           **Figure 4d** is a flowchart of another embodiment of the invention.  
19

20           **Figure 4e** is a flowchart of one embodiment of the invention in which a stored  
21 voice paging receiver can have various modes for operation.  
22

23           **Figure 5a** shows a sample data record that can be prestored and contained  
24 within a personal communication device.  
25

26           **Figure 5b** shows a sample display of message notifications received at a  
27 personal communication device.  
28

29           **Figure 5c** shows a memory address register within a personal communicator  
30 device which stores caller id and voice message data received.  
31

1           **Figures 6a and 6b** are block diagrams of receiving fax header information and  
2           transmitting as caller identifying information.

3           **Figures 7a and 7b** show improved ACK-BACK stored voice device.  
4  
5

## DETAILED DESCRIPTION OF THE INVENTION

One particular problem with conventional paging systems using message center devices is the requirement that a caller must manually enter their call back telephone number. One such example of a manual entry system is disclosed fully in US 4,172,969 issued to Levine et al, US 4,072,824 issued to Phillips, and also US 4,103,107 issued to D'Amico et al. This can be cumbersome particularly if the calling party wishes to also leave a voice message or send some other message data such as a facsimile. In addition it is especially difficult for a calling party to enter an alphanumeric message during manual entry as a great majority of communications over the PSTN originate from devices with standard numeric keypads that generate DTMF signals. One invention which attempts to address the problem of alphanumeric entry by a telephone set is US 4,918,721 issued to Hashimoto. However such an approach is still cumbersome to use and is time consuming for the calling party. As well, the longer it takes for a calling party to enter caller identifying information, the less time a message center at the called party location is available to accept other calls. This invention attempts to resolve these and other problems.

In addition, in stored voice paging receivers there is no ability to sort through or organize voice messages except to listen to them sequentially. This can be inconvenient for the called communicant as they may want to skip certain messages until later, but must listen to at least part of all of each message as the voice data cannot be displayed. This invention attempts to address this problem as well. The automatic transmission of caller id or ANI data from the PSTN to a message center, for storage and retransmission along with optional other data to a paging center to be received in a personal communicator is also addressed in this invention. Other advantages and objects will be realized by the description which follows.

Figure 1a shows a prior art stored voice paging receiver without a display means that enables a called party to fast forward and reverse through voice messages received. Though useful, this type of device requires the called party to listen to part



1 of each message received before determining which message to listen to. The  
2 invention described herein teaches how an improved stored voice paging receiver can  
3 include a display that shows the identity of the callers before the voice message is  
4 selected and heard by the called party.

5  
6 In Figure 1b is shown one embodiment which may receive textual caller  
7 identifying data and display the data on a display means. Additionally, received textual  
8 caller identifying data can be applied to a text to speech synthesis section for  
9 annunciation prior to the replay of a voice message. Alternatively, caller identifying  
10 information may be received in an audible voice form and played prior to the replay  
11 of a voice message.

12  
13 Figure 1c shows an alternative embodiment of a stored voice paging receiver  
14 with prestored voice or sound signals and a coincidence detector, along with a DTMF  
15 tone decoder.

16  
17 Figure 1d shows an alternative embodiment of a non-display autodialing type  
18 paging receiver with text-to-speech synthesis.

19  
20 A detailed description of the device operation in Figures 1b - 1d will follow later  
21 in this specification.

22  
23 Figure 2a shows a paging system to be described hereinafter in which caller id  
24 data is received and stored at a called station location with a message center device  
25 and retransmitted to a paging center over the public switched telephone network  
26 (PSTN).

27  
28 Figure 2b shows an alternative embodiment in which a personal message  
29 center is located at the telephone office (102) rather than at the called party office  
30 (300), such as voice mail service offered by the Regional Bell Operating Companies  
31 such as Pacific Bell Telephone. For brevity, the discussions herein are directed to

1           Figure 2a although it is recognized that the inventions described herein could  
2 be applied to a system such as described in Figure 2b, or other similar systems.

3  
4           In Figure 2a, a calling party places TEL 1 in an off-hook condition and initiates  
5 a communication over the PSTN via telephone line (501) to an originating central  
6 office(101) through telephone line (502) to terminating central office (102). The caller  
7 id data is supplied in the conventional manner between the ringing signals from the  
8 terminating central office (102) through telephone line (503) to a called station location  
9 (300) which has a message center (301) and extension telephone TEL 3.

10  
11           Alternately, caller id data in an ISDN environment can be sent as described in  
12 Bellcore document SR-NWT-002006 entitled National ISDN, U.S. Patent 4,899,358 and  
13 4,922,490 patents issued Blakely, and other Bellcore technical references widely  
14 available and not described but incorporated herein by reference. Typically caller  
15 identifying data supplied from custom calling services in an ISDN environment can be  
16 received and stored at a message center similar to a POTS environment and later  
17 transmitted to a paging receiver held by a remotely located called party.

18  
19           Message center device (301) may be a conventional telephone answering  
20 device, a personal computer with voice/fax mail or modem communications, or a  
21 conventional facsimile device, or some other device suitable for receiving incoming  
22 calls automatically and initiating automatic outgoing calls automatically to a paging  
23 center in response to calls received.

24  
25           US Patents 4,737,979, 4,821,308, 5,333,179, 5,159,624, 5,208,850, 5,077,786,  
26 5,014,296 and 4,985,913 and 5,128,980 are all variants of such devices and are  
27 incorporated herein by reference, though not fundamental to the claimed invention. For  
28 example, 4,821,308 issued to Hashimoto requires manual DTMF entry by a calling  
29 party of the calling parties number. In 4,985,913 caller identifying information can be  
30 automatically received and stored to generate a particular paging notification but the

1 actual caller identifying data received and stored is not transmitted to a called  
2 communicant through a paging center.

3  
4 Fundamental circuitry for telephony and telephone related devices can be found  
5 in Understanding Telephone Electronics, Third Edition, by Bigelow, also incorporated  
6 herein by reference. Also incorporated herein by reference is a textbook entitled Voice  
7 Processing written by Gordon E. Pelton which is a useful reference for fundamental  
8 concepts discussed in this specification.

9  
10 Additionally, other devices that may be incorporated in the message center  
11 include a telephone answering device with video telephone as described in US  
12 5,046,079, also incorporated herein by reference. Such a device is capable of  
13 receiving a picture signal sent between the ringing signals that is intended to establish  
14 the identity of the calling party similar to conventional textual or audible caller id  
15 information. The caller identifying video image may be stored on a recording medium.  
16 Telephone devices at the calling party side (TEL 1) that could be used include the  
17 AT&T VideoPhone 2500 or other popular teleconferencing products available recently  
18 on the personal computer. For example, US Patent 5,278,889 incorporated herein by  
19 reference describes one such implementation of a video telephony system. For  
20 purposes of brevity it is understood that methods other than those discussed at length  
21 for textual data detection and reception would be more appropriate for transmitting  
22 caller identifying video images, as is well known in the art.

23  
24 Message Center device (301) may automatically initiate an off-hook condition  
25 in response to a ringing signal by using a ring detect interface circuit or some other  
26 means, as is well known in the art. The Message Center device (301) also has a caller  
27 id detection circuit which is suitable for detecting caller id data transmitted in between  
28 the first and second ringing signals. The caller id detection circuit for textual data  
29 includes a filter and demodulator circuit that is used for demodulating a 300 baud rate  
30 of incoming serial data stream using the technique of Frequency Shift keying. Data

1 received by the circuit may include data representing the incoming telephone number,  
2 name, date and time of the current incoming call.

3  
4 In a Personal Computer device equipped with a modem that can receive  
5 incoming calls, caller id can also be received. Such a device is becoming more  
6 popular with users in that a variety of modems that can receive facsimile and/or  
7 facsimile combined with voice messages are currently available. In US 5,343,516  
8 issued to Callele et al. is shown a computer system which can receive caller  
9 identification information supplied between the ringing signals in the conventional  
10 manner, which is incorporated herein by reference. This invention is interesting in that  
11 it provides for the delivery of caller id information to a computer device connected to  
12 the PSTN which can transfer caller id data over a network to other computers and  
13 telephone sets that are the destination of the incoming telephone call. This patent  
14 does not teach how to communicate this information to a remote wireless personal  
15 communicator however.

16  
17 In one embodiment as described in this invention, the modem monitors the  
18 phone line between the first and second ring burst without causing the data access  
19 arrangement to go off hook in the conventional sense, which would inhibit  
20 transmission of Calling Number Identification. A V.23 1200 bbs modem receiver  
21 may be used to demodulate the Bell 202 signal. The ring indicate bit (RI) may be used  
22 on a modem to indicate when to monitor the phone line for CND information. After  
23 the RI bit sets, indicating the first ring burst, the host waits for the RI bit to reset. The  
24 host then configures the modem to monitor the phone line for Calling Number  
25 Identification. The CND signalling starts as early as 300 ms after the first ring burst  
26 and ends at least 475 mS before the second ring burst.

27  
28 The received calling Number Identification may then be stored in a memory  
29 means in the Personal Computer as herein described. Calling name and other  
30 information could also be received, stored and transmitted using ascii character  
31 representations of the data in a similar fashion. In an alternative embodiment, the

1 received number information could be used with a table look-up to append the  
2 prestored calling parties name in the personal computer with the received numeric  
3 caller id data for retransmission to an alphanumeric paging center. Blocked information  
4 represented by the ASCII character "P" could also be received , stored and  
5 retransmitted to a paging center, or used to inhibit a paging transmission to a personal  
6 communicator device. Alternate numbers could be specified by the calling party to be  
7 used as the Incoming Line Identification number, as is seen in US 5,283,824 issued  
8 to Shaw and incorporated herein by reference. The calling party may be provided with  
9 the option of having the number of his calling station or some other number used as  
10 the Incoming Caller Identification number such as his/her home or business telephone  
11 number. This option could be provided to the calling party by the telephone switch  
12 in the case of a credit card or other type call, or could be provided to the calling party  
13 by the message center by means of audible voice instructions . In either case  
14 alternate data could be stored for later transmission from the message center to a  
15 paging transmitter.

16  
17 The caller identifying data could also be used as described in US 4,985,913, US  
18 5,278,894 and others incorporated herein by reference, in which customized greeting  
19 messages could be used when particular caller id data is received at the message  
20 center.

21  
22 Alternatively, the message center device (301) may include an ANI detection  
23 circuit rather than the caller id detection circuit previously described. ANI encoding is  
24 a function performed by the network which identifies the originating phone number of  
25 the message delivered to the received telephone line. ANI encoding is currently used  
26 in "911" information systems, 800 and 900 numbers and many private PBX exchange  
27 systems. For example, in US 4,313,035 issued to Jordan et al. incorporated herein  
28 by reference is described a paging service in which the ANI directory telephone  
29 number of the calling party may be delivered and stored at a TSPS (Traffic Service  
30 Position System) and stored in a data base. Using a paging facility such as the  
31 BELLBOY personal signalling system, a paging signal can be generated to a remote

1 called party. The called party, in response to an alert in a paging receiver, can then  
2 initiate an inquiry call to determine the identity of the caller and return the call. In the  
3 improved invention described herein, the identity of the calling party is delivered  
4 automatically to the called party paging receiver.

5  
6 ANI may also be delivered to the message center device and then retransmitted  
7 to a paging center with multi-frequency or DTMF tones using a somewhat different  
8 data transmission protocol from caller id, which will now be described.

9  
10 The information delivered from ANI ranges from Level A service that provides  
11 caller area code only to Level D service that provides caller area code, city, local  
12 exchange # and phone #. Further details about ANI are shown in US Patent  
13 4,942,598 issued to Davis and Bellcore Technical Reference TR-NWT-000064 and FSD  
14 20-20-0000 entitled LATA Switching Systems Generic Requirements - Automatic  
15 Number Identification and Operator Number Identification, which are both incorporated  
16 herein by reference. Such an alternative arrangement may prove to be useful to  
17 customers utilizing inbound 800 numbers as the primary access for calling parties to  
18 a message center.

#### 19 20 **ANI DETECTOR USED IN A PAGING CENTER**

21  
22 In a related disclosure, ANI information instead of caller id information can be  
23 used for transmission to a called party personal communicator. By incorporating an  
24 ANI decoder directly within a paging center, calling party ANI information can be  
25 incorporated in a system similar to that shown in copending applications 08/177,550  
26 and 08/177,551.

27  
28 Hereinafter, the generic term caller id shall be used interchangeably to describe  
29 conventional number and number/name caller id, ANI, video, fax header or alternate  
30 manually entered caller identifying data.

1 It should be understood that when a particular implementation is referring to  
2 ANI, the necessary decoding circuitry and transmission protocol would be used as  
3 opposed to different decoding circuitry and transmission protocol used for Caller ID  
4 or other caller identifying data.

## 7 **CALLER ID USED IN A PAGING SYSTEM WITH A SEPARATE MESSAGE CENTER**

9 The message center device includes a memory to store and retrieve caller  
10 identifying data received in a memory means, as is well known in the art. One such  
11 apparatus is described in US 5,238,818 and US 5,390,346 issued to Klausner et al  
12 and incorporated herein by reference. The message center device (301) also has  
13 prestored paging transmission data in a memory means which may include at least  
14 the telephone number of the paging center and any pager id data that will ensure data  
15 transmitted will be sent to the appropriate called party. The pager id data typically  
16 ranges from 4 to 15 digits in length to uniquely identify a paging receiver. Such  
17 prestored data may be automatically recalled at the message center to generate  
18 dialing instructions to a paging center upon receipt and storage of an incoming call  
19 and optional data message.

21 Upon receiving caller id data supplied from the terminating central office at the  
22 called station location, the caller id data is stored in a memory means or on a hard  
23 disk drive and the message center device then initiates an off-hook condition to  
24 answer the call. Then if the message center device (301) is of the type that stores  
25 voice messages, an outgoing message such as conventionally generated by a  
26 telephone answering machine or PC voice mail system or video telephone answering  
27 machine may be transmitted to the calling party and a calling party may respond by  
28 annunciating a voice or video message. The voice or video message is received and  
29 stored at the message center (301). In addition, the stored voice or video data may  
30 be encoded or compressed to conserve memory storage space in the message center  
31 device. Compression of the message data will also reduce transmission time required

1 later when the message data is sent in a subsequent paging transmission from the  
2 message center device (301) to a paging center (105). One such compression  
3 algorithm which is known as G.723 is slated for approval by the International  
4 Telecommunications Union (ITU). It is intended for use with real-time multimedia,  
5 simultaneous voice and data, and conferencing applications. A software solution that  
6 delivers such a compression algorithm is available from a company known as DSP  
7 Group, Inc. out of Santa Clara, California, known as TrueSpeech. This software  
8 currently will run on processors such as the Texas Instruments TMS320C5X, Motorola  
9 56156 Digital Signal Processor, Intel 386/486/Pentium, Analog Devices 2100 and other  
10 processors.

11  
12 The voice or other data may be stored contiguously in a memory location with  
13 caller id data received or stored in a different memory location and associated with  
14 caller id data received and stored, for later transmission to a called party personal  
15 communicator(201). After the data is stored on a recording means at the message  
16 center device (301) the calling party at TEL 1 hangs up.

17  
18 Other message data received by the message center and associated with caller  
19 id data could be received and stored in a similar fashion. For example, the message  
20 center may receive a facsimile image, or a video telephone message. Received  
21 facsimile or video image data could be stored with caller ID or caller identifying data  
22 and transmitted to a paging receiver adapted to store and view facsimiles or video  
23 images along with associated caller id or caller identifying data. Such data could be  
24 encrypted such as is described in US 5,285,496 issued to Frank et al. and  
25 incorporated herein by reference or encoded as previously described to reduce the  
26 message size for storage and transmission.

27  
28 Other textual special message data such as described in US 4,811,382 could  
29 be captured at the message center to be transmitted to a paging center, which is  
30 herein incorporated by reference. This textual data could be sent to the message



1 center in place of caller identifying data or along with caller identifying data that could  
2 be used as a header record for notification within a personal communicator device.

3  
4 Upon detecting that the called party has disconnected, the message center  
5 device (301) hangs up. Then the message center device (301) is returned to an off  
6 hook condition and automatic paging instructions are retrieved from the prestored  
7 memory means in the message center device. In the case where a paging transmitter  
8 is integral to the message center, no outward dialing to the PSTN is required but  
9 instead, a paging transmission may occur directly. In the case where a second  
10 telephone line is connected to the message center, the message data received on the  
11 first telephone line from the calling party could be sent out to a paging center over the  
12 second telephone line prior to disconnection with the calling party on the first  
13 telephone line.

14  
15 Follows is described a system where a paging center is connected to the  
16 message center by a connection with the PSTN. Dialing instructions prestored  
17 typically would include the modem access # for the paging center, and a pin #  
18 associated with a particular personal communicator device or pager which is usually  
19 either 4, 7, or 15 digits in length, but could be any unique identifying data. A calling  
20 signal is sent to a paging center (105) through telephone line (503) to originating  
21 central telephone office (102) and telephone line (504), to terminating central  
22 telephone office (103).

23  
24 Terminating central telephone office (103) is connected to paging center (105)  
25 by a modem adapted to establish communication using predetermined  
26 communications protocol suitable for the type of paging service provided. For  
27 example, data communication protocol may be significantly different for numeric data  
28 from that required for stored voice data communications.

29  
30 The paging center (105) answers in response to a calling signal from a  
31 message center and the data representative of caller id data is sent to the paging

1 center from the memory of the message center. The caller identifying data is sent to  
2 the paging center using the predetermined signalling protocol (to be discussed  
3 hereinafter) followed or preceded by any optional data to be transmitted. Alternatively,  
4 the message center could employ a tone or other decoder responsive to control  
5 signals generated by the paging center. Such a tone or other tone decoder could be  
6 employed prior to initiating the transmission of caller id and message data using a  
7 predetermined signalling protocol, rather than automatically transmitting the data by  
8 default or after a predetermined time period elapsed. As one example of various  
9 signalling protocols that could be used, US Patent 4,878,051 and 4,868,860 issued to  
10 Andros et al. is incorporated herein by reference.

11  
12 Copending applications 08/177,550 and 08/177,851 both deal with paging  
13 centers of the type that incorporate a caller id detection circuit connected to the  
14 paging center that allow automatic detection and transmission of caller identification  
15 data to a numeric, alphanumeric, or stored voice paging receiver or personal  
16 communication device.

17  
18 If the paging center is the type which allows caller id data to be detected from  
19 an incoming caller and transmitted to a paging receiver automatically as described in  
20 the above patent applications, the transmission of caller id data may be prevented by  
21 a special signal present in the data transmission from the message center or by some  
22 other means. For example by preceding the string of data sent from the message  
23 center with a # sign, the paging center will detect the "#" sign and disable storage  
24 and transmission of any caller identification data received at the caller id detector of  
25 the paging center for that particular incoming call from the message center (301).  
26 Such caller id data of the message center location would not be transmitted to the  
27 called party portable communication device(201) in this case. Instead, the caller id  
28 data of the original calling party would be sent to the pager. In another example, a  
29 caller id blocking signal could be appended to the outward dialing signal that would  
30 instruct the terminating central office to block transmission of caller id data from the  
31 message center. Alternatively, the absence of a special signal in the string of data

1 sent from the message center (301) could indicate that the caller id data detected by  
2 the caller id detector in the paging center and the string of prestored caller identifying  
3 data from the message center would both be sent to called party personal  
4 communicator (201). Alternatively, only the caller identification data corresponding to  
5 the message center could be sent and the caller id data corresponding to the original  
6 calling party could be prevented from transmission to a called party personal  
7 communicator. Such modifications in the invention herein provide flexibility for the  
8 called parties to receive very diverse information at their paging receiver. Additionally  
9 receipt of, in the above case, a "#" sign could allow for the storage of the caller id data  
10 corresponding to the incoming call from the message center, but prevent the data  
11 from being transmitted along with data received from the message center. Such a  
12 feature would be useful to the operators at the paging center who might wish to know  
13 from where their call volume originated.

14  
15 In yet an alternative embodiment, the paging subscriber could predetermine in  
16 advance at the paging center which calling parties they wished to receive pages from.  
17 Any other calling parties not having a corresponding caller id signal that matched the  
18 prestore preferences at the paging center would not be able to cause a paging signal  
19 to be transmitted.

20  
21 If paging center (105) is not of the type that is caller id enabled, then no such  
22 special code is necessary to inhibit unwanted caller id data of the message center  
23 (301) from transmission. In this case the caller id and other data received and stored  
24 at the message center (301) may be automatically, or in response to a control signal  
25 originating from the paging center (105), be transmitted to the paging center from the  
26 message center. The message center could also automatically insert other caller  
27 identifying or other data corresponding to items such as the number of facsimile pages  
28 or actual voice or fax message received, or some other useful information to be sent  
29 to a paging center along with the caller id data and optional message data.  
30

1 In one preferred embodiment within the message center (301), the caller ID data  
2 is recalled from the memory means of the message center and converted to DTMF  
3 signals. One device particularly useful for conversion of caller id data to DTMF signals  
4 is manufactured by Nicollet Technologies, Inc. known as the DTS-2040.

5  
6 Such DTMF signals representative of numeric caller id data are then transmitted  
7 from the message center to the paging center after the paging center has answered  
8 the call initiated by the message center and signalled that it is ready to receive data.  
9 This feature is especially useful in a numeric paging environment.

10  
11 Conversion at the message center of the stored caller id data to be  
12 retransmitted over the PSTN to a paging center is not limited to DTMF signals, but  
13 may also include other signalling means appropriate for alphanumeric data typically  
14 received from caller id services such as name and date information. In another device  
15 manufactured by Nicollet Industries, Inc., the DTS-1082 can capture caller id data and  
16 convert it to ascii data for storage and later retransmission from the message center  
17 to a paging center.

18  
19 In addition, fax header or E-mail information received at the message center  
20 could be used alternatively as caller identifying information. Figures 6a and 6b  
21 summarize one embodiment of this concept. The message center could, for example,  
22 upon detection of a CNG tone, store conventional fax header information received for  
23 retransmission to a paging center or for transmission to a personal communicator  
24 directly from a paging transmitter integral or directly connected to the message center.  
25 The fax header or Email information could be transmitted to a personal communicator  
26 device that has prestored caller data contained in a memory along with a comparing  
27 means. The caller data could include a variety of information corresponding to  
28 frequent callers, including name, address, telephone number, fax number, and E mail  
29 addresses for each calling party. Additionally, a prestored voice annunciation  
30 corresponding to the identity of a caller or a prestored video image representative of  
31 the calling party could also be included in each caller record. Upon detection of a

1 coincidence between the fax or E mail or other data received, the other associate data  
2 from the corresponding data record could be made available to the called party.

3  
4  
5 **CALLER IDENTIFYING DATA COMPRISED OF FAX HEADER DATA**  
6 **TRANSMITTED TO A PAGING CENTER AND PERSONAL COMMUNICATOR**  
7 **DEVICE**

8  
9 Fax header information and the protocol for communication between facsimile  
10 message communications devices is notoriously old. For reference, see the book  
11 entitled FAX: Digital Facsimile Technology and Applications, Second Edition, and  
12 Standards developed by the CCITT (International Telegraph and Telephone  
13 Consultative Committee) including T.30 incorporated herein by reference. Other  
14 standards are widely known though not discussed in detail here.

15  
16 Briefly, in a message center which is receiving a Group 3 fax from a calling  
17 party, the calling parties device can send a coded signal known as the transmit  
18 subscriber identification (TSI) after handshaking is established during what is referred  
19 to as the call set up or phase A. Typically the calling fax dials the telephone number  
20 of the message center over the PSTN. The ring signal and the CNG calling tone are  
21 received at the called message center and the CNG tone indicates the call is from a  
22 fax machine instead of a voice call. The called message center answers the call by  
23 going off hook. Then typically after a one second delay, the called message center  
24 sends its called station identification (CSI), a 3 second 2100 Hz tone, back to the  
25 calling fax machine.

26  
27 Then during Phase B known as the premessage procedure, the called fax  
28 machine sends the TSI which includes at least the telephone number of the calling  
29 party fax machine. This information is typically used in the message center as fax  
30 header information. But in this invention, it could be used alternatively as caller  
31 identifying data that can be stored in a memory at the message center for transmission

1 to a paging center to a personal communicator device similar to the methods  
2 described for other caller id data. Such TSI data could be used alternatively for those  
3 areas or users that do not have caller id service. In addition, such message data in  
4 the TSI may include alphanumeric characters representing the calling party, time and  
5 date information and page number data. In a system using only number only caller  
6 id, for example, the alphanumeric data corresponding to the name of the sending party  
7 contained in the TSI could be appended to the numeric caller id data for transmission  
8 to a paging center and personal communicator device. Such a method could be  
9 activated by the detection of a CNG signal at the message center. Alternatively, a  
10 means of counting the pages received could be employed at the message center, and  
11 the total number of pages received could be appended to the caller identifying data.  
12 In another embodiment, only faxes of a certain length would be sent to a personal  
13 communicator device.

14  
15 Predefined user preferences could be used within the message center along  
16 with a comparing means using the caller identifying TSI information to determine  
17 whether the image data received would be sent to a personal communicator device  
18 or just the notification data comprised of the caller identifying data.

19  
20 In any case, alphanumeric caller identifying data could be transmitted to a  
21 paging center or through an integral paging transmitter connected to the message  
22 center using the same alphanumeric protocol currently used in conventional  
23 alphanumeric paging systems known as TAP or IXO, incorporated herein by  
24 reference. These protocols could be suitable signalling means for transmission of  
25 alphanumeric caller id data from the personal message center device to a paging  
26 service modem. Typically this conventional alphanumeric protocol operates at 300  
27 baud and is well known in the art.

28  
29 Of course in this case the paging center would require a suitable decoder that  
30 could receive and decode the alphanumeric data from the message center. This  
31 feature is especially desirable in an alphanumeric paging service in that some textual

1. alphanumeric information may be transmitted automatically for the calling party using  
2 a conventional telephone at the TEL 1 which is typically devoid of any alphanumeric  
3 input means. This is a significant improvement over the prior art. Various other  
4 signalling protocols could be used between the message center device and the  
5 modem at the paging center without departing from the spirit of this invention that may  
6 be more adapted to higher data transmission speeds, compression algorithms or the  
7 like. For example, the PCIA has made available other protocols for alternative data  
8 transmission such as image and other data referred to as TDP Protocol, issued June  
9 12, 1993, which is incorporated herein by reference. These protocols could be  
10 modified to incorporate caller identifying data fields for transmission with other optional  
11 data. Some paging centers do not adhere strictly to published protocol but instead  
12 have a variant of their own. In this case, it could be possible for the message center  
13 to establish the protocol used by the paging center dynamically by first recognizing  
14 and then selecting from among several different known protocols for subsequent  
15 transmission of the alphanumeric caller identifying data in a form recognized by the  
16 paging center. Incorporated herein by reference is a good reference entitled  
17 Understanding Data Communications, Third Edition by Held which gives a fundamental  
18 overview of various communications methods and terminology.

## 19 20 **TEXT TO SPEECH CONVERSION CONDUCTED AT THE TERMINATING CENTRAL** 21 **OFFICE**

22  
23 Alternatively, the terminating central office (102) could apply a text to speech  
24 converter, similar to that shown in US 4,899,358 issued to Blakely, in which an  
25 annunciated caller identifying signal is sent from the terminating switch to the message  
26 center device at the called station location. It is incorporated herein by reference.  
27 Such annunciated caller identifying information could be particularly useful when used  
28 in a stored voice paging receiver similar to devices shown in US 4,965,569 Bennett et  
29 al., US 4,868,560 issued to Oliwa, 4,873,520 issued to Fisch et al., and US 5,153,579  
30 Fisch et al., also incorporated herein by reference.  
31

1 In one embodiment the caller id data is supplied to the message center from  
2 the terminating central office as an audible voice representation of caller id data and  
3 stored at the message center. Such data may also be encoded as previously  
4 described to conserve memory storage.

5  
6 In this embodiment the audible encoded caller id data can be transferred to a  
7 paging center as previously described along with any optional data for transmission  
8 from a paging center and annunciation at a personal communication device.

9  
10 **TEXT TO SPEECH CONVERSION WITHIN THE MESSAGE CENTER OR PAGING**  
11 **CENTER**

12  
13 Alternatively, received and stored textual caller id data could be applied to a  
14 speech synthesizer unit contained within the message center or paging center, as  
15 partly described in US Patent 4,720,848 issued to Akiyama, 5,349,638 issued to  
16 Pitroda et al. or US 4,742,516 issued to Yamaguchi, which deals with a communication  
17 system with a voice announcement means. They are herein incorporated by  
18 reference. Also incorporated herein by reference is a software product offered by  
19 Stylus Innovation, Inc. out of Cambridge Mass. known as Visual Voice which runs on  
20 a personal computer. Using a digital signal processor in the personal computer, text  
21 to speech processing can be applied to caller id data. The resulting speech signals  
22 representative of the caller id data can be stored in a storage means within the  
23 message center for transmission to a stored voice paging center.

24  
25 In addition, the Visual Voice system has an international language support that  
26 can speak the caller id data in the language desired by the called party at a personal  
27 communication device or at the message center. In any case, received textual caller  
28 identifying data which is stored at the message center is transferred to a paging  
29 center and transmitted as audible speech signals to a stored voice paging receiver.  
30 Alternatively, the textual data may be applied to a text to speech converter within a  
31 personal communication device for annunciation, as is well known in the art.



1 Irrespective of the signalling used after the calling party has disconnected with the  
2 message center, DTMF or other signals representing the stored caller id data are sent  
3 from the message center through the PSTN to the paging center. Any optional data  
4 such as additional voice message data, DTMF, image or other message data entered  
5 by the calling party may also be transferred from the message center (301) memory  
6 means to the paging center for transmission to the called party personal  
7 communicator (210) via radio link (509). Such a feature is useful in paging systems  
8 which include stored voice paging receivers and non-voice paging systems such as  
9 described in 5,095,307 or 4,961,216, which are also incorporated herein by reference.  
10 In the case where caller id service is not available to a calling or called party,  
11 particularly in the case of stored voice paging systems, a DTMF entry could be made  
12 by the calling party to represent the caller identifying data to be transmitted with  
13 optional data such as a voice message. If the caller id detector failed to detect any  
14 caller id, a default voice message prompt could be generated by the message center  
15 that instructed the caller to enter at least their telephone number in the conventional  
16 manner using an input device at the calling parties telephone. Then the caller could  
17 be instructed to leave an optional voice message which could then be transmitted to  
18 a paging center after the caller hangs up. Such data would be stored at the message  
19 center as previously described and then the message center could automatically call  
20 the paging center. Alternatively, caller identifying data could be detected, an  
21 acknowledgement of the received and stored caller id data could be annunciated back  
22 to the caller, and an option could be given to modify or change the caller id data prior  
23 to leaving a voice or other optional data message.

24  
25 Other caller identifying data which may be more readily recognized by the called  
26 party could be entered in place of the caller id data for example.

27  
28 The information could then be transmitted by the paging center and received  
29 at a stored voice paging receiver for display, annunciation and used as redial data  
30 within the personal communicator device. This feature is especially useful in those  
31 cases where no caller identifying data would otherwise be associated with a voice

1 message for transmission to a stored voice paging receiver or personal communicator  
2 device and is a significant improvement over the prior art stored voice paging  
3 receivers.  
4

5 A special code such as "\*" or some other special code could be used to  
6 signal the end of any DTMF or other signal data representative of caller id and to  
7 signify the beginning of transmission of optional data stored at the message center.  
8 This code could be automatically included by the personal message center or  
9 manually entered by the calling party for storage and transmission with the caller  
10 identifying data string stored at the personal message center. Optional data, such as  
11 a voice message or other data entered or sent by a calling party could then be stored  
12 and transmitted after the caller identifying data and demarcation code. Other coding  
13 methodologies which demarc the stored caller id data from other stored optional  
14 message data may be used and are not fundamental to the claimed invention herein  
15 but are considered obvious to those skilled in the art.  
16

17 In the example above, wherein said optional data is a voice message, the  
18 receipt of a special code signal at the paging center (105) from the message center  
19 (301) could enable a voice storage memory and receiving means at the paging center  
20 to distinguish other data representative of caller id information from optional data such  
21 as voice messages. In addition, the data types of the caller identifying data and  
22 optional message data could be different from each other and not require any  
23 demarcation data. In one such case, caller identifying textual data could be detected  
24 by one type of detector at the paging transmitter, and voice or image data could be  
25 detected by another type of detector at the paging transmitter. The paging center  
26 could then store the data received and retransmit the data to a personal communicator  
27 device.  
28

29 The paging center may receive the optional data such as a voice or textual  
30 message from the message center to be stored in a memory means at the paging  
31 center. When the transmission is completed from the messaging center, the

1 communication with the paging center is ended and the message center and the  
2 paging center hang up.

3  
4 The paging center then initiates a paging transmission to the appropriate paging  
5 receiver and retrieves any stored caller id data and optional data from the memory  
6 means transferred from the message center. After the pager id is decoded in the  
7 conventional fashion at the personal communicator device, the telephone number and  
8 /or number and name (if present) and optional date and time information  
9 representative of the caller id of the calling party, along with any optional data  
10 message such as a voice, text or image message, are received by the called party  
11 personal communicator.

12  
13 Such received data could be stored in different memory locations or in one  
14 contiguous memory within the personal communicator device, demarcated by the  
15 special coding method employed, to be accessed within a stored voice or other  
16 paging receiver held by the called party in a variety of ways known to those skilled  
17 in the art.

18  
19 In one example, to access the caller id data, a called party might press a "view"  
20 button to see the caller identifying data. Or by default, the caller id data might be  
21 displayed automatically when received or after a PIN is entered by the called party. To  
22 access the actual voice message, a called party might press a "play" button. Such a  
23 personal communicator could also be responsive to voice commands annunciated by  
24 the called party into a microphone and a voice command unit within the personal  
25 communicator device which is connected to the microphone and is responsive to  
26 commands such as "PLAY", "REWIND", "FORWARD", etc.. In addition, stored voice  
27 messages could be recorded on a removable memory such as a PCMCIA memory  
28 card that is now very popular in portable computing devices. Stored voice messages  
29 with or without corresponding caller identifying data could be transferred from the  
30 personal communicator device to another computing or voice message storage device  
31 in a central location such as the office of the called party.

1     **PERSONAL COMMUNICATOR DEVICE WITH IMPROVED TIME DATA INPUT**  
2     **MEANS USING CALLER ID DATA**

3  
4             In the caller id data received and stored at the paging center or message  
5 center, time data corresponding to the time and date a communication was received  
6 could be transmitted to a personal communicator device. This could be particularly  
7 useful in a system in which several messages received were held in a queue for some  
8 time before a transmission occurred to the personal communicator device. The time  
9 data could be used as a sorting record at the paging center or message center to  
10 determine which calls were transmitted in a batch fashion as opposed to immediately  
11 transmitted upon receipt at the paging or message center.

12  
13             For example, all calls received during peak periods during a certain time of day  
14 may be transmitted later off-peak to reduce congestion on the wireless communication  
15 system. Or all calls received during weekends or holidays could be transmitted in a  
16 lower priority queuing sequence than calls received during the week. In addition,  
17 message data received at the personal communicator could be organized and  
18 accessed according to the date and time the communication was completed in a very  
19 accurate and automatic fashion for the calling and called party. See related US Patent  
20 4,872,005 issued to DeLuca et al. incorporated herein by reference.

21  
22             In addition, such caller id time and date data could be used to initialize a time  
23 of day clock contained within a personal communicator device such as a Personal  
24 computer, cellular phone or the like. This could be beneficial in the circumstance  
25 where a power failure erased the time and date information ordinarily entered manually  
26 by a user. Other devices such as VCRs, automobile clocks and the like could be  
27 equipped with a receiver that could accept such information as well.

1 **CALLER ID FROM A PBX WITH AN INTEGRATED OR CONNECTED**  
2 **TRANSMITTER TO A PERSONAL COMMUNICATOR**

3  
4 The message center could be directly connected to a paging transmitter that  
5 would not require a dial in via the PSTN to a paging network. In one embodiment, the  
6 message center and the paging transmitter could be an apparatus similar to that  
7 described in US 5,151,930 issued to Hagl which describes a paging system within a  
8 telephone private branch exchange and incorporated herein by reference. Such a  
9 system could be modified such that any calls coming in from outside the PBX could  
10 be passed through a caller id detector circuit as previously described, and this  
11 information could be sent through to a personal communicator or call device.  
12

13 In an alternate embodiment, caller id data could be delivered to a local paging  
14 system such as a unit offered by Motorola known as "Site-call" which is typically  
15 connected to a PBX such as the Meridian 1 manufactured by Northern Telecom.  
16

17 Appropriate software and hardware at the PBX could capture and deliver ANI  
18 or Caller ID data to the "Site-Call" or similar local paging system. The prior art local  
19 paging systems require a calling party to enter their telephone number by DTMF entry,  
20 which is then transmitted by a local paging transmitter. This is limited in that only  
21 numeric data may be received and displayed to alert a called party. Alternatively in the  
22 prior art systems, a message such as "outside call" is displayed at the pager. By  
23 integrating various concepts taught in the invention herein, telephone number data  
24 and other caller identifying data may be automatically sent from a PBX to an onsite  
25 pager for display, annunciation, or other alerting means.  
26

27 Alternately, a call could be received at the PBX and if the call was unanswered  
28 at the called station, a message could be taken in a voice mail center and the caller  
29 id data( along with an optional voice or other message) could be delivered to a paging  
30 receiver by way of an onsite or offsite paging transmitter.  
31

1           The message center device may be directly connected to a paging terminal,  
2           thereby eliminating the necessity of a second connection to the telephone network.  
3           The paging terminal could be a "People Finder" paging terminal manufactured by  
4           Motorola, Inc..

5  
6           In another implementation, the message center device is interfaced to a paging  
7           terminal such as the Modax paging terminal manufactured by Motorola, Inc. which was  
8           adapted to transmit additional caller identification information with a standard paging  
9           transmission. The interface from the message center to the paging terminal may be  
10          through a 1 or 2 telephone line interface. The interconnection to a paging terminal  
11          and the terminal's subsequent operation are well known in the art. The paging  
12          terminal transmits to a personal communicator which is capable of receiving and  
13          decoding paging signals modulated by the paging terminal in a radio frequency  
14          manner. The personal communicator also has the capability to store a message and  
15          to play back a message which may include caller identifying source indicator data as  
16          previously described that may be viewed on a display member or heard first through  
17          an annunciation means.

18  
19          In FIGURE 2b is described a message center which is at the telephone office  
20          rather than the called party office. The concepts previously described for a called  
21          party office based message center could also be modified and incorporated in the  
22          conventional voice mail system offered by the telephone company.

23  
24          **AUTOMATIC PAGING TELEPHONE SET USING CALLER ID INSTEAD OF DTMF**  
25          **FOR CALLER IDENTIFYING DATA**

26  
27          In US 5,128,980 issued to Choi is described a system in which a calling party  
28          may enter their phone number using DTMF for automatic transmission to a paging  
29          center and is incorporated herein by reference. This method could be modified to  
30          incorporate a caller id detector which would be substituted for, or supplied in addition  
31          to, the DTMF receiver. When the device is in a pager number recording mode (either

1 between the first and second ringing signals or after the device is placed in an  
2 off-hook position) the caller id data may be entered and stored automatically for the  
3 calling party, may be manually entered by DTMF entry by the calling party, or may be  
4 entered and stored using part of the caller id data supplied automatically and part of  
5 the data manually entered by the calling party. Then the caller identifying data can be  
6 transmitted to a paging center along with any optional data as described in the patent  
7 in an automatic, manual, or combined fashion.

## 8 9 **COINCIDENCE DETECTION WITHIN THE MESSAGE CENTER**

10  
11 Optional data such as a voice message can be selectively transmitted to the  
12 called party, based on some comparator at the message center that analyzes the  
13 source identity of the calling party with prestored user preferences determined in  
14 advance by the called party. Or by default, all optional data received could either be  
15 stored for later retrieval by the called party or stored and transmitted to the called  
16 party personal communicator device along with the caller identifying data. The paging  
17 transmission can be encoded at the paging transmitter to economize on valuable  
18 transmission time, and then later decoded on a real time or delayed basis within the  
19 receiving called party personal communicator. Private flagged caller id data and  
20 optional messages may be automatically omitted from storage at the message center  
21 or omitted from transmission to a personal communicator device.

## 22 23 **STORED VOICE COMMUNICATOR WITH TEXT HEADER INFORMATION DISPLAY**

24 Incorporated herein by reference is US 5,390,362 issued to Modjeska et al.  
25 This patent discloses a method of combining voice and data into a message format  
26 that can be sent to a pager capable of receiving a combination voice and data  
27 message. A called party may selectively review header information corresponding to  
28 the calling party prior to listening to any received voice message. A paging transmitter  
29 such as described in this disclosure can be modified to incorporate a caller id or ANI  
30 decoder (207) or fax signal decoder (209) in automatic telephone input (202) that can  
31 receive data automatically from the PBX or PSTN (108) and store this data in paging

1 terminal controller memory (232). Voice synthesizer (208) can playback for the calling  
2 party a text to speech synthesized representation of caller id or ANI data and ask  
3 whether the data should be sent with the paging message. For example, the voice  
4 synthesizer (208) can receive textual caller id or ANI data such as "5556-1212 John  
5 Smith" from the ANI or Caller ID decoder and then generate the following instructional  
6 message to the calling party, "Press or say 'ONE' if you wish for '555-1212 John Smith  
7 calling.' to be transmitted. Press or say 'TWO' if you wish this information to be  
8 transmitted and marked urgent. Press or say 'THREE' if you wish for this information  
9 to not be sent and you wish to enter some other data from your touchtone keypad or  
10 keyboard." The calling party, upon hearing the synthesized voice annunciation, then  
11 can select which caller identifying data should be sent. In the case of a stored voice  
12 paging system, upon hearing confirmation of the desired caller identifying data, the  
13 calling party would then be instructed to leave a voice message, which would be  
14 stored in the voice store and forward module (216). The confirmed caller identifying  
15 data would be stored in memory 232 to be linked with the voice message data stored  
16 in memory 224 for transmission from transmitter base station 226 to a selective call  
17 receiver. In the case of a paging system equipped with a fax store and forward  
18 module 216 and fax signal decoder 209, fax header information as previously  
19 described could be received and stored in memory 232, fax data could be received  
20 and stored in memory 224, and the contents of memories 224 and 232 could be  
21 transmitted by transmitter base station 226 to a selective call receiver.

22  
23 In US Patent 5,283,818 is shown a message system which describes a system  
24 linking textual data with voice messages, and is incorporated herein by reference.  
25 Such an apparatus could be modified to incorporate the transmission of caller  
26 identifying data and voice data to a stored voice paging receiver, via a call from the  
27 message center to a paging transmitter via the PSTN as previously described. In  
28 addition, to economize on minimizing the time spent connecting with a paging center,  
29 the messages received at the message center could be queued for batch transmission  
30 either during offpeak periods or periodically. Exceptions could be made for urgent



1 message transmission that could occur without waiting for the message queue  
2 transmission.

3  
4 Another patent incorporated herein by reference is US 5,258,751 issued to  
5 DeLuca et al. Message storage slots can include caller identifying data display which  
6 has been transmitted to a selective call receiver or personal communication device as  
7 discussed hereinbefore. Any corresponding voice or other message data can then be  
8 displayed or annunciated after the user selects the desired message for review.

9  
10 Upon receipt at the personal communicator device, the user could scroll  
11 through the received messages such as described in US 5,285,493 issued to Wagai  
12 et al. and incorporated herein by reference, or by numerous other methods discussed  
13 in the various personal communicator apparatus described by reference or example  
14 herein.

15  
16 The messages could be stored chronologically, with resequencing of the  
17 previously stored messages occurring automatically upon receipt of any new message  
18 or deletion of any previously recorded message. Alternatively, the messages with the  
19 caller id header data could be selectively stored as determined by the user in a  
20 number of ways. The messages could be stored based upon preselected criteria. For  
21 example, all messages determined to be of an urgent nature or from a particular  
22 communicant could be automatically stored in the firstmost message storage slot  
23 positions. In another embodiment, all messages could be analyzed and then stored  
24 sequentially in an ascending or descending order, based on the caller id header data  
25 presented. US Patent 5,225,826 is incorporated herein by reference and discloses a  
26 selective call receiver with an integral time of day clock. Messages received with  
27 identical header data records could be stored according to the time and date received  
28 within the selective call receiver, the time and date data present in the header data, or  
29 according to urgent indicators contained in the header data.

1     **TEXT TO SPEECH CONVERSION OF CALLER ID HEADER DATA WITHIN A**  
2     **PERSONAL COMMUNICATOR DEVICE**

3  
4             In another embodiment, the textual information received at the personal  
5 communication device could be applied to a codec within the personal communicator  
6 device which is particularly suited to visually impaired persons. Application of a text  
7 to speech codec which converts received caller id signals to audible speech signals  
8 is well known in the art, as shown in US 5,289,530 issued to Reese and incorporated  
9 herein by reference. Such a personal communicator device could be manufactured  
10 without a display member to reduce manufacturing costs for specialized purposes.  
11

12             In the case of a stored voice message which is transmitted to a stored voice  
13 type called party personal communicator without a display member, textual caller  
14 identifying data could be annunciated. Such a device could also employ a display  
15 member that was capable of selectively or simultaneously displaying caller identifying  
16 data received at the personal communicator device.  
17

18     **COINCIDENCE DETECTION WITHIN A PERSONAL COMMUNICATOR DEVICE**  
19

20             Data representative of caller id information may be used at the called party  
21 personal communicator as key record data which could comprise the notification  
22 display or could generate some other associated notification means within the called  
23 party personal communicator in response to receipt of the caller identifying portion of  
24 the message. The personal communicator device could employ a coincidence detector  
25 which may generate a number of notification events in response to a match with  
26 prestored data or user preferences compared against the caller id data received. For  
27 example, upon detecting that a coincidence existed with a prestored data record, a  
28 prestored visual image of the calling party could be displayed. In another instance,  
29 a coincidence detection within the personal communicator device could require a  
30 called party to enter a personal identifying entry before the confidential message could  
31 be reviewed. In yet another embodiment, a coincidence detection could inhibit any

1 associated message transmitted from a message center from being reviewed by the  
2 called party at the personal communicator device. In yet other embodiments, received  
3 fax header information or Email addresses could be compared against a prestored  
4 directory within the personal communicator device to display or annunciate other  
5 corresponding data records.

## 6 7 **EMBODIMENT USING BLOCKED CALLER ID DATA**

8  
9 Upon receipt of a "blocked" caller id data such as described in LSSGR - Class  
10 Feature: Calling Identity Delivery Blocking Features - FSD 01-02-1053, US 5,341,411  
11 issued to Hashimoto entitled Caller ID Blocking Method and Processing System, and  
12 US Patent 5,161,181 issued to Zwick entitled Automatic Number Identification Blocking  
13 System (all incorporated herein by reference and subject to modification with the  
14 present invention), the personal communicator device could respond by not storing  
15 the message at the message center which would have been directed to the personal  
16 communicator device. In addition any blocked caller id data could be used at the  
17 message center to store and prevent retransmission of the data to the personal  
18 communicator device. Alternatively a calling party could selectively omit the  
19 transmission of caller ID data by using the blocking signal and sending to the personal  
20 communicator device only manually entered data, such as a DTMF signal, a card  
21 swipe in a magnetic card reader, a voice message, image or other data in place of  
22 caller id data automatically supplied by the telephone company.

## 23 24 25 **REDIAL MEMORY EMBODIMENT**

26  
27 Received caller id data can be selectively transferred to a data buffer within the  
28 called party personal communicator device for redialing, as seen in US 4,924,496  
29 issued to Figa and US 4,873,719 issued to Reese, incorporated herein by reference.  
30 Logic can be incorporated into the receiving device that distinguishes either  
31 positionally or by filtering the numeric data from the alphanumeric data to ensure that

1 only the numeric data was retrieved and transferred to a data buffer for redial  
2 instructions. Such redial instructions within a personal communicator device could  
3 include the ability to distinguish between a local dialing mode in which caller identifying  
4 data corresponds to call-back numbers within the local calling area. In this case, only  
5 the local portion of the caller id data representing the calling parties telephone number  
6 would be used to generate a dialing instruction from the personal communicator  
7 device. In other cases, the entire caller id representing the telephone number of the  
8 calling party could be used to generate a dialing signal. This is well known in the art  
9 as described in US 4,985,918 issued to Tanaka.

10  
11 Typically Caller ID data transmitted includes either 7 digit or 10 digit numeric  
12 data corresponding to the calling parties telephone. Other recent proposals related  
13 to the field of Caller Identification deal with automatic transmission of Caller  
14 identification from international callers which may consist of less than the required data  
15 to complete a return call to the original calling party but more than 7 or 10 digits.

16  
17 In one embodiment, upon receipt of an interstate caller id consisting of a 10  
18 digit numeric caller id number such as 305-555-1212, it is necessary to insert a "1"  
19 prior to converting caller id data received into a dial signal for the called party to return  
20 the call from a cellular telephone device which may be integral or connected to the  
21 personal communicator device. Such caller id data as described herein would not  
22 complete a dialing signal unless the user manually dialed the digit "1" before the  
23 remaining digits were dialed out. As a function of the improved redial circuit in this  
24 invention, any ten digit caller id data received and stored could automatically be  
25 preceded with a digit "1" at the personal communicator device rather than requiring  
26 manual entry by the called party prior to dialing. Additionally, in response to receipt  
27 of an international caller id numeric sequence, the international caller id data could be  
28 preceded by a country code and international calling code like "011" such as is  
29 conventionally used. In an alternative embodiment, such additional calling code data  
30 could be appended at the message center or at the paging center prior to  
31 transmission to a personal communicator device. In some cases a called party may

1 wish to call in first to a long distance service such as 1-800-CALLATT, then enter their  
2 account code and pin, and then redial the caller id number received.

3  
4 In the case where a credit call should be made as described above, the  
5 personal communicator device may not automatically insert any special calling codes  
6 to be appended to the caller id data received, but instead may use the caller id data  
7 as received for redial data after the other credit calling data is transmitted. In the case  
8 where special calling code data has been appended prior to receipt at the personal  
9 communicator device, the personal communicator device could strip away or disable  
10 the calling codes such as "1" or "011" and only generate the necessary calling  
11 sequence corresponding to the telephone number of the original calling party, using  
12 the last 10 significant digits in the case of a domestic call. In any case such additional  
13 features would be very beneficial to the user of such an equipped personal  
14 communicator device with a redial feature.

15  
16 Where caller identifying data received is comprised of speech signals that  
17 represent the calling parties telephone number and/or name, such data could be  
18 stored, transferred and used as a redial instruction from the personal communication  
19 device to a communication network which was well equipped to receive voice  
20 commands for a dialing instruction, such as is seen currently in the Sprint Voice  
21 Foncard service and other services, incorporated herein by reference. Selectively or  
22 in combination, the speech signals representing the name or telephone number of the  
23 calling party could be generated by the personal communicator device to  
24 communicate redial instructions to a communication system with voice recognition or  
25 with speech command capability.

## 26 27 **MEET ME SERVICE EMBODIMENT**

28  
29 Such features could be useful as well in a "Meet me" service in which a calling party  
30 is placed on hold at the message center. Typically a calling party is instructed to  
31 remain on hold and may be asked to enter their telephone number by DTMF entry or

1 entry of a special signal which constitutes a "meet" request. Then the DTMF or special  
2 signal is sent through a paging transmitter to a paging receiver. When the paged  
3 communicant receives the page, they may call back on a telephone link to the meet  
4 me center to be connected with the calling party. However it requires manual entry  
5 by the calling party of the call in number of the meet-me service and the called party  
6 cannot always remember or know who may be calling by the telephone number alone.  
7 Such information is critical for the called party to properly screen meet requests. One  
8 system incorporated herein by reference is described in US 4,172,969 issued to Levine  
9 et al. In this system, the caller is instructed to dial his calling number. The signals are  
10 then conveyed over the telephone line to the receiver telephone answering device to  
11 be transmitted to a mobile receiver unit. Another such system is described in part by  
12 US 5,208,849 issued to Fu, incorporated herein by reference which can be adapted  
13 to my invention. Another Meet me type system is described in US 5,327,480 issued  
14 to Breeden, and 5,151,929 issued to Wolf incorporated herein by reference which can  
15 be adapted to my invention.

16  
17 By incorporating the automatic transmission of calling party number and name  
18 in an alphanumeric paging network for example, the called party can more accurately  
19 determine who is calling before accepting the "meet" invitation. In the case where a  
20 voice Caller ID is supplied by the terminating central office to the meet me service at  
21 the message center, the called party can hear an annunciation of the callers identity  
22 from a personal communicator device suitable for the replay of such information.

23  
24 The called party personal communicator receives a "meet" request from the  
25 paging center which consists of at least the meet request signal supplied  
26 automatically or a meet request signal initiated by the calling party. In addition to, or  
27 in place of the meet request signal, the caller id data received and stored at the  
28 message center corresponding to the calling party on hold can be transmitted to the  
29 personal communication device. The calling party could also at this time enter other  
30 additional information such as an urgent indicator or special code agreed upon  
31 between the calling party and the called party for transmission along with the caller id

1 data and/or meet request. In any case, the calling party is instructed to remain on  
2 hold while the called party is paged for a possible meet by the paging center.

3  
4 If the called party does not respond within a prescribed period of time, the  
5 calling party can then additionally be instructed to leave optional data such as a voice  
6 message that can either be retrieved later by the called party, or can be transmitted  
7 to the called party personal communicator after the caller disconnects. In another  
8 embodiment if the calling party does not wish to wait any longer for the called party  
9 to call in to the meet me center, then the called party can interrupt the meet me  
10 service by for example depressing the # sign.

11  
12 At this point the message center at the meet me service can instruct the caller  
13 to enter optional data such as a voice message for storage and/or transmission to the  
14 called party. After the calling party disconnects from the message center at the meet  
15 me service, the message center can send an additional signal in a second  
16 transmission to the personal communication device through a paging center or  
17 integral paging transmitter. This signal can indicate that the calling party hung up and  
18 that a "meet" with the calling party at the message center is not possible. This  
19 transmission can also include any optional voice or other data left by the calling party.

20  
21 Such data which is to be transmitted can be incorporated with the previously  
22 stored caller id data at the message center for transmission to the personal  
23 communicator device. Alternatively the optional data such as a voice message can be  
24 transmitted to the called party personal communicator device and appended to, or  
25 associated with received caller id data from the calling party.

26  
27 In the above described or similar systems, the detected caller id information can  
28 be transmitted automatically to the personal communicator device in a more efficient  
29 manner that will provide more information to the called party and relieve the calling  
30 party of inconvenience.

1           Of course caller id blocking options could be employed as previously described  
2 in this application. Other variants of these "meet me" services could also easily employ  
3 a caller id detector to transmit the caller identifying data automatically. For sake of  
4 brevity, these various systems are not described in detail although it is believed that  
5 those skilled in the art can adapt the methods described herein.

## 6 7       **AUTO DIALING PERSONAL COMMUNICATOR EMBODIMENT**

8  
9           The paging receiver device could also be a dedicated paging receiver with a  
10 DTMF signal generator such as seen in US 4,490,579 issued to Godoshian, 5,099,507  
11 issued to Mukai et al. 5,280,516 issued to Jang or 5,212,721 issued to DeLuca et al.,  
12 incorporated herein by reference. Received caller id data received could be used to  
13 generate a dialing signal in an acoustically coupleable dialer device, or via an external  
14 telephone line connector within the called party personal communicator. The received  
15 caller identifying data could be digital data representative of numeric information  
16 corresponding to the call-back number of the calling party. Such received digital data  
17 could be applied to a DTMF generator to output a dialing signal.

18  
19           Alternatively, the received caller identifying data could be audible DTMF signals  
20 which were recorded as audible signals at the message center after manual entry by  
21 a calling party. In another embodiment, textual caller id data could be converted to  
22 audible DTMF signals at the message center to be transferred to a voice paging center  
23 as audible signals. Upon receipt at the paging center, the audible signals could be  
24 transmitted to a personal communication device along with any optional data. The  
25 audible DTMF sounds and optional data could be stored and replayed through a  
26 speaker.

27  
28           Alternatively the DTMF sounds could be converted to a dial signal for a cellular  
29 telephone device or via a telephone line connector. The received audible DTMF signals  
30 could be applied to a DTMF decoder and character generator within the personal  
31 communicator device to display the audible DTMF sounds received. This method



1 could be particularly useful in that the personal communication device would not  
2 require a DTMF generator to create a dialing signal. In addition, audible DTMF sounds  
3 could be prestored into a personal communication device or dialing apparatus by  
4 means of a computer download interface that releasably electrically or acoustically  
5 coupled to a dialing apparatus or personal communicator with a memory means,  
6 control means and data input receiving means.

7  
8 These audible DTMF sounds could then be used as described previously to  
9 generate an audible dial signal for acoustical coupling, or converted to an electrical  
10 signal for other dialing means.

11  
12 In a different embodiment, the received and stored DTMF sounds could be  
13 applied to a DTMF decoder and character generator and optional text to speech unit  
14 to display or annunciate the data received. The personal communicator or dialing  
15 apparatus could interpret the stored audible DTMF signals within the personal  
16 communicator or dialing device and generate a display or voice annunciation of the  
17 telephone number information. This could be accomplished by a standard DTMF  
18 decoder circuit and character generator such as described in US Patent 4,882,750  
19 issued to Henderson et al. incorporated herein by reference and a text to speech unit  
20 well known to those skilled in the art.

21  
22 This improvement could be useful in autodialer devices such as described in  
23 this patent. For example, a circuit commonly used to store voice signals such as the  
24 Radio Shack, part number 276-1324 or Radio Shack part number 276-1325 could be  
25 used to store and replay the received DTMF signals through a transducer in a  
26 conventional autodialer. The audible DTMF signal could be received by a sound input  
27 means which was connected to the circuit during a programming mode. During a  
28 replay mode, the DTMF sounds previously programmed could be replayed through  
29 a transducer attached to the autodialer, or the DTMF sounds could be transferred to  
30 a transmitting means that could generate the DTMF signal to a communication link  
31 such as in a cellular or landline communication system.

## **COMBINED PAGER / RADIOTELEPHONE EMBODIMENT**

The paging receiver device could alternatively be contained within a cellular telephone device as in US 5,117,449 issued to Metroka et al. or in US 5,148,473 issued to Freeland et al. in which a paging and cellular radio telephone function are combined in a single device. These patents are also incorporated herein by reference.

When the paged party receives a page, the caller id data can be stored for later use and an alert tone, a vibration, a visual indication or a voice message can alert the called party who may be engaged in a telephone conversation on the cellular telephone. When the paged party wishes to return the call from the calling party after hanging up, the stored caller id data can be selected and recalled for dialing at the touch of a button.

Of particular utility, alphanumeric caller id data received can textually identify a calling party to aid in selection of a desired callback number and the included numeric caller id information can be utilized to generate a dialing signal. In a number only caller id transmission the number only will be supplied to the combined pager/radiotelephone. In this case, the received numeric information can be transferred to a comparing means and compared against a prestored directory in the device. In this manner, the paged party can more easily identify the caller and return the call more efficiently. US 4,924,496 issued to Figa describes one such method in greater detail and has already been incorporated herein by reference.

## **PCMCIA PAGING RECEIVER EMBODIMENT**

Another alternative embodiment using the claimed invention can be seen in US 5,043,721 issued to May which discloses a paging accessory using a PCMCIA interface which is connected to a personal computer or integrated in a computing device. This patent is incorporated herein by reference.

## 1     **STORED VOICE PAGING RECEIVER AND SYSTEM EMBODIMENT**

2  
3             The following discussion is specifically related to stored voice paging receivers  
4 and paging systems.

5  
6             In stored voice paging receivers it is possible to receive voice messages which  
7 may be heard by a called party. In the prior art systems is shown a method in which  
8 voice messages may be stored at a paging center from a calling party and then the  
9 message may be transmitted to a paging receiver. These systems typically include  
10 pager ID control data along with any voice message for playback through a codec unit  
11 at the paging receiver. The codec converts the data received into an audio  
12 reproduction of the calling parties voice message that may be heard from a speaker  
13 or sound output device in the paging receiver.

14  
15            Such devices are useful in that the called party may have a voice message  
16 delivered to them rather than having to call in to a message center or voice mail  
17 center.

18  
19            However, in part, the popularity of such devices has been limited in that there  
20 is no means for preventing other people to whom messages are not intended from  
21 hearing voice messages of a personal or confidential nature if the message is replayed  
22 by the recipient in their presence.

23  
24            It is difficult for the called party to ascertain the identity of the calling party prior  
25 to playing the message received to know who is calling prior to broadcasting the  
26 message in the presence of others in the nearby area. To review a stored message  
27 the user was required to press play and the voice message was annunciated from an  
28 integrated speaker in a communication device. This was impractical for a called party  
29 that was engaged in a meeting that wanted to discretely listen to an urgent message  
30 without having to leave or have other persons hear the message. In addition the  
31 previous stored voice paging receivers gave no visual indication of who was calling.

1 The previous stored voice paging receivers stored messages received based on the  
2 time the messages were received. This required that the messages had to be  
3 reviewed in the same order regardless of the possibility that an urgent message may  
4 not be heard until the very end of message review. This was very inconvenient if the  
5 message required a prompt reply from the called party. In US 5,153,579 issued to  
6 Bennett et al. is described a method of fast forwarding through messages stored  
7 chronologically. This method, though useful, requires a user to sequentially listen to  
8 parts of all messages preceding a possible urgent message received.

9  
10 In this invention is further shown a novel means in which voice messages  
11 received may be selectively broadcast or heard confidentially based upon the caller  
12 identifying data received.

13 The stored voice communication device and invention herein include a method of  
14 selectively determining how voice messages are stored and annunciated using source  
15 identifier information, a comparator in the communication device and called party  
16 preferences for annunciation determined by a called party.

17  
18 Another object is to provide a stored voice communication device which shows  
19 a method of converting caller identifying information into audible speech signals for a  
20 called party.

21  
22 Another object is to provide an improved stored voice communication device  
23 that includes a method of transmitting voice message data with source identifier  
24 information.

25  
26 Another improvement is to provide a more efficient method of fastforwarding  
27 and reversing through messages received in such a device than in the prior art.

28  
29 Such caller identifying data received may include textual data representative of  
30 caller id data automatically supplied from the PSTN as described previously, or may  
31 include some other textual data such as received from a DTMF entry by the caller at

1 a message center or paging center, an E-Mail message or document received with an  
2 embedded or compressed voice message, or other data. For example, textual data  
3 representing the identity of the sending party could be represented by an E-mail  
4 address such as HASHIMOTOK@HCJ.COM. The message could be transmitted to  
5 a selective call receiver along with a voice message which was sent by a calling party's  
6 personal computer equipped with a sound board with appropriate software. In  
7 addition, the caller identifying information could be a particular iconographic  
8 representation of the calling party such as described in the Magic Cap software  
9 environment using so called Telescript technology available from General Magic and  
10 incorporated herein by reference, or a still video image of the calling party transmitted  
11 with the voice message by the calling party premises equipment.  
12

13 For example, visually displayable images transmitted after the message center  
14 device has gone offhook in response to a ringing signal could be received and stored  
15 with an associated voice message. One such implementation particularly adapted to  
16 simultaneous voice and visual data transmission that is currently being implemented  
17 is known as VoiceView. Incorporated herein by referenced and manufactured and  
18 licensed by Radish Communications Systems, Inc. out of Boulder, Colorado.  
19 VoiceView lets calling parties transmit visual images along with voice data in a  
20 standard POTS environment, which in the preferred embodiment could be captured  
21 and stored in a memory means at the message center for later transmission to a  
22 paging receiver or personal communication device. Alternatively, in an ISDN  
23 environment, simultaneous transmission of voice and image data could occur in a  
24 similar fashion such that message or caller identifying visual data could be stored  
25 along with a voice message for later transmission to a communication device.  
26

27 This information could be displayed on a display member upon receipt of the  
28 message at the stored voice communication device in advance of annunciating, or  
29 simultaneous with, annunciation of the voice message.  
30

1           Alternatively, the caller identifying information could be used to generate an  
2 audible alert means such as prestored sound data contained within the communication  
3 device and applied to a comparing means that corresponds to choices made by the  
4 called party. Or received caller identifying data could be applied to a text-to-speech  
5 generator contained within the paging receiver and annunciated to the called party. US  
6 Patent 4,975,693 issued to Davis et al. is incorporated herein by reference.

7  
8           Alternatively, the caller identifying data received at a paging center or message  
9 center could be applied to a data generator which would compare the caller identifying  
10 data received and generate predetermined character strings for transmission to a  
11 communication device such as described in US 4,962,377 issued to Wallace et al. and  
12 incorporated herein by reference.

13  
14           Alternatively, the received textual data could be converted to a text to speech  
15 converter at the paging center prior to transmission to the stored voice communication  
16 device.

17  
18           Upon receipt of a message at the communication device, only the caller  
19 identifying data would be displayed or annunciated prior to annunciation of the voice  
20 message after selection by the called party. In addition, such voice messages  
21 received from certain parties could be marked as of a confidential nature by the calling  
22 party so that a password would be required by the called party to hear the message.

23  
24           In another preferred embodiment, the personal message center could comprise  
25 a voice mail center, a personal computer or a conventional telephone answering  
26 machine as previously described and well known in the art. In such systems, the  
27 received caller id data could be used with a comparing means at the voice mail center,  
28 personal computer or conventional telephone answering machine to selectively  
29 transmit associated voice message data without the caller identifying data. Such a  
30 feature is a substantial improvement over existing paging systems. This is a departure  
31 over the prior art in that prior art voice message systems do not transmit voice data

1 to conventional stored voice paging receivers. One of the main advantages of such  
2 an approach is that the cost of the stored voice paging receiver is reduced because  
3 there are no display means required in the voice paging receiver.  
4

5 Alternatively, the called party could preselect which calling parties could require  
6 a password upon receipt and prior to playback. Callers from a particular calling group  
7 could be assigned with an automatic annunciation attribute in which any received calls  
8 from this group would automatically be broadcast, no matter when the message was  
9 received. See US Patent 5,073,767 issued to Holmes et al. and US Patent 5,146,217  
10 issued to Holmes et al. which are incorporated herein by reference.  
11

12 In one embodiment the stored voice communication device may receive all  
13 voice messages and based upon the caller identifying data or password data also  
14 received, may selectively broadcast through a speaker or playback only through a  
15 sound output accessory such as an earphone, based upon the desired mode of  
16 annunciation predetermined by the called party with annunciation mode instructions.  
17 Such instructions could be as data associated with prestored caller identifying data  
18 and the voice message, or by an annunciation mode switch that was connectable to  
19 a comparing means.  
20

21 If for example, a message received was determined to be of a private nature not  
22 available for broadcast, the message could not be heard unless an earphone was first  
23 attached to the communication device and the message was selected for playback.  
24 Alternatively, the communication device could sense that the earphone was attached  
25 and automatically playback the message through the earphone without any further  
26 selection. See US Patent 5,075,684 issued to DeLuca and incorporated herein by  
27 reference.  
28

29 In addition, it may be useful for messages received and stored in the personal  
30 communication device to be transferred for archival at a personal computer. Such a  
31 personal communicator could be fitted with a serial, parallel, infrared or other

1 communication link and appropriate data transfer capability so that received messages  
2 could be transferred to another device for speech to text transcription, archival voice  
3 message storage or other functions.  
4

5 The stored voice communications device includes a means for receiving  
6 transmitted voice messages, receiver identifying control information, and source  
7 identifier information such as caller id, ANI, synthesized caller id, DTMF, image, or the  
8 like. Further the device may include a first audio output means such as an integrated  
9 speaker, an optional second audio output means such as an earphone jack, a third  
10 optional text to speech output means and a codec means to convert data received  
11 into audible voice data. Further the device may include a selection and storage means  
12 for prestoring called party annunciation selections, and a comparing means to match  
13 caller identifying data received with the prestored called party annunciation  
14 preferences.  
15

16 A first switch means allows a received voice messages to be delivered using the  
17 first audio output means by default, unless otherwise directed by prestored called  
18 party preferences .  
19

20 A second switch means allows received voice messages to be delivered using  
21 the second output means by default, unless otherwise directed by prestored called  
22 party preferences.  
23

24 A third switch means allows received caller identifying data received to be  
25 delivered to a text to speech conversion means, although it is recognized that such  
26 data could also be applied to such a conversion means automatically by default rather  
27 than based on the switching means. US Patent 4,742,516 issued to Yamaguchi shows  
28 one method of text to speech translation and is incorporated herein by reference.  
29 Another US Patent 4,716,583 issued to Groner shows another method of text to  
30 speech translation and is also incorporated herein by reference.  
31



1           The stored voice paging receiver also includes a selection and storage means  
2 to allow a user to predetermine which corresponding source identifiers will utilize the  
3 first audio output means, the second audio output means or the third text to speech  
4 conversion means. In addition, based upon the caller identifying data received, the  
5 communication device could determine which order voice messages would be stored  
6 and accessed in a message storage means. For example, all the messages marked  
7 urgent could be accessible first, or the messages could be retrievable based upon  
8 the time sent, or based on the identity of the caller. All callers that were determined  
9 to be family members may be prioritized differently than callers that were business  
10 contacts.

11  
12           A password means in the communication device allows for preselection of a  
13 password by the called communicant and entry of a password prior to annunciation  
14 of messages determined to be from a calling party that may be of a private nature.

15  
16           A comparator means in the stored voice communication device compares the  
17 received and/or stored voice message source identifier with predetermined user  
18 preferences and stores and delivers the received messages based on the  
19 predetermined user preferences.

20  
21           Further as previously described, the stored voice personal communicator could  
22 also include a dial function in which the speaker or transducer used to annunciate  
23 voice messages could also be used to acoustically couple the communicator and to  
24 generate a dial signal as has been described hereinbefore. Audible DTMF signals  
25 received at the stored voice paging receiver, or digital numeric data converted to  
26 DTMF at the communicator could generate a dialing signal.

27  
28           In Figure 1b is shown an improved stored voice paging receiver with a display  
29 for caller identifying textual or image data and a text-to-speech unit for converting  
30 textual data received into audible voice signals. Also the device may include a

1 coincidence detector to compare caller identifying data received with prestored data  
2 records.

3  
4 In the functional block diagram in Figure 1 the paging receiver 10 of the present  
5 invention includes a receiving means 12, a decoding-controlling means 14, a memory  
6 means 50, an audio amplifier 40, a sound output means 37, an input switch module  
7 42, an energy conservation means 20, and a converting means 38. An antenna 24  
8 receives paging information in the form of selective call signals, information comprised  
9 of speech signals representative of a voice message and information comprised of  
10 caller identification data for display or annunciation before, during or after annunciation  
11 of the voice message. The antenna 24 is coupled to receiving means 12 that is  
12 subject to the control of decoder 14. The decoder 14 not only controls receiving  
13 means 12, but may also operate receiving means 12 on an intermittent basis to extend  
14 the life of battery 16 through energy conservation means 20. The receiving means 12  
15 detects the presence of electromagnetic energy representing the paging information  
16 and applies the information to the converting means such as coder-decoder 38.  
17 Operating under control from decoder 14 (line 45), the coder-decoder 38 converts the  
18 received signals, such as an audio speech signal to a stream of binary bits and  
19 reconverts the stored binary bits to a replica of the original received analog signal,  
20 such as synthesized audio speech signals. A microcomputer 26 functions as the  
21 decoder 14 and is comprised of a microprocessor 28 and a read only memory (ROM)  
22 30. ROM 30 includes the necessary instructions to operate microprocessor 28 to  
23 perform the functions as described below. The microcomputer 26 uses  
24 microprocessor 28 as a software decoder for processing the received signals in real  
25 time according to predetermined software routines. Such routines could provide for  
26 detection of specific demarcation codes that distinguish audio or textual caller  
27 identification data from audio voice messages for storage, annunciation and replay.

28  
29 After the paging receiver is selectively identified, microprocessor 28 accesses  
30 ROM 30 for determining the correct instructions contained in that memory for  
31 processing the received signals, converting the analog voice signals to digital form,

1 storing the digital form of the voice signal, storing the caller identification data,  
2 displaying the caller identification data on the display means 77 and other functions.  
3 For example, text to speech synthesis means 75 can convert bit representations of  
4 textual caller identification data received with voice data into synthesized voice signals  
5 to be annunciated through audio amplifier 40 and sound output means 37 under the  
6 direction of microprocessor 26 and input switch module 42. For example, upon  
7 hearing a default alert signal from sound output means 37 indicating receipt of a  
8 message, the subscriber could press "PLAY" 56 and the synthesized voice  
9 annunciation of caller identification information would be retrieved from the memory  
10 means and annunciated, such as "John Smith - 555-1212 called". Then upon a  
11 second depression of the "PLAY" button, the stored voice message may be retrieved  
12 from the memory means 50 and replayed for the subscriber. In another embodiment,  
13 caller identification data received could be displayed on a display means 77 when a  
14 message was received, or in response to scrolling through a list of messages  
15 previously received and selected using key input selector 61, touch-screen input from  
16 display means 77 or other keyboard selections and software as is known in the art.

17  
18       Upon selection of a particular caller identifying record, the microcomputer 26  
19 could retrieve the corresponding voice message from the memory means 50 for  
20 annunciation. Additionally under the direction of the microcomputer 26, a coincidence  
21 detector 76 could be employed to compare caller identifying data with prestored data  
22 records in memory means 50. Upon determining a matching record, microcomputer  
23 26 could cause caller identifying data and / or any associated record or annunciation  
24 alert to be automatically displayed on display means 77 or annunciated using sound  
25 output means 37. Additionally, key input module 42 could include a synthesize mode  
26 key 78 in which textual data entered by keyboard 53, stored on memory means 50 or  
27 received from receiving means 12 could be selectively converted from text-to-speech  
28 for annunciation.

29  
30       In the illustrated embodiment, the coder-decoder 38 (hereinafter referred to as  
31 CODEC) provides for the digital-to-analog and analog-to-digital conversion of speech

1 signals. The CODEC 38, such as an adaptive delta modulator, converts or encodes  
2 an audio input signal(line 44) to a digital data stream (line 46) for storage in memory  
3 means 50, and reconverts or decodes a digital data stream (line 48) to reconstruct an  
4 audio signal (line 21). Under control of decoder 14, the CODEC's digital output is  
5 stored in memory 50 and retrieved on line 48 to reconstruct a synthesized audio signal  
6 on line 21, thus closely replicating the real time audio signal in both amplitude and  
7 frequency. One example of such a coder-decoder is disclosed by N.S. Jayant in the  
8 publication "Adaptive Delta Modulation with a One-Bit Memory", Bell System Technical  
9 Journal, Vol. 49, No. 2, Mar. 1970. To conserve power, most of the CODEC 38 is  
10 turned off when there are no read/write operations to the memory. The receiving  
11 means 12 is further coupled by line 23 to an audio amplifier 40. Operating in response  
12 to decoder 14, the real time audio signal on line 23 is applied to audio amplifier 40  
13 which supplies the analog signals to sound output means 37. In particular, decoder  
14 14 controls audio amplifier 40 via line 62 to apply either the real time audio signal on  
15 line 23 or the synthesized audio signal on line 21 to sound output means 37.

16  
17 Decoder 14 is coupled to memory means 50 which serves to include  
18 information for decoding the received information and for storing information received  
19 from CODEC 38. The CODEC 38 provides the analog-to-digital conversion in memory  
20 50 as digital voice messages. In this embodiment each digital voice message is stored  
21 in conjunction with associated caller identifying data. As previously described, such  
22 data could be textual, synthesized audio or graphical data. This associated caller  
23 identifying data can be used to selectively access voice message records before  
24 selecting a particular voice record for replay. A plurality of digital voice messages can  
25 be stored in memory 50. The decoder 14 functions to alert the paging user, and to  
26 store, recall, and playback voice messages, as well as to store, recall, and playback  
27 caller identification data.

28  
29 The paging receiver of Figure 1 has a capacity of storing voice messages and  
30 providing them to audio amplifier 40 according to the state of a plurality of inputs, such  
31 as the state of the control switches of input module 42, the state of annunciation

1 instructions ascertained by coincidence detector 76 and prestored data records  
2 contained in memory means 77, and particular encoded annunciation instructions  
3 received by receiving means 12 that comprise part of the message data.  
4

5 A switch interface 18 provides input capability for control switches 54-78 and  
6 keyboard 53. Display means 77 also may employ a switch interface means to allow  
7 for touch screen selection for data input, menu selection and the like. Illustratively,  
8 control switch 54 is an on/off switch for controlling power from battery 16. Control  
9 switch 56 is a play switch for playing back voice messages previously digitized and  
10 stored in memory 50. Control switch is a reset switch to reset the paging receiver  
11 system and to monitor any real time audio signals currently being received. Control  
12 switch 60 is a mode switch for operating the decoder in one of three modes. These  
13 modes are the silent, push to listen (PTL) and normal modes.  
14

15 The battery 16 is shown connected to decoder 14 through switch interface 18.  
16 Battery 16 provides power to decoder 14 through an energy conservation means 20,  
17 such as a DC to DC converter. Decoder 14 is additionally connected to a code  
18 memory 22 which stores predetermined address information to which the paging  
19 receiver is responsive. Code memory 50 can also store such information as the  
20 sampling rate for digitizing the received audio messages. Output 62 from decoder 14  
21 controls whether real time audio signals on line 23 from receiving means 12 or  
22 synthesized audio signals on line 21 from CODEC 38 are applied to audio speaker 37.  
23 Communication between receiving means 12 and decoder 14 is achieved via line 47.  
24 Selective call signals for the decoder 14 are received by receiving means 12 and  
25 passed to decoder 14 through line 47.  
26

27 The operation of the paging receiver shown in Figure 1b is such that the  
28 receiving means 12 is capable of receiving messages in any of several message  
29 formats through antenna 24. The decoder 14 responds to the received signals to  
30 analyze the data and select one of several decoding schemes for appropriately  
31 decoding the incoming information received by receiving means 12. As is well known

1 with paging devices, the resulting decoded signal is tested for comparison with a  
2 designated pager address contained in code memory 22. On detecting  
3 correspondence between the received and decoded signal and the address in code  
4 memory 22, the decoder 14 instructs the CODEC 38 to digitize the real time analog  
5 voice signals that follows for storage in one memory 50. The inventions described  
6 herein are not specifically limited to analog systems but could also be adapted to a  
7 digital stored voice paging system in which voice or image data was transmitted in a  
8 compressed or uncompressed format. An alert output signal may be produced by  
9 the decoder 14 to generate an alert indication to the pager user that a message has  
10 been received and stored. In particular, the alert output signal from the decoder 14  
11 is supplied to audio amplifier 40 to produce an audible signal from the sound output  
12 means 37 indicative of receipt of a message. Alternatively the decoder 14 can supply  
13 alert signals or data to audio amplifier 40 and sound output means 37 and/or display  
14 means 77 in response to alert output instructions contained in prestored data records  
15 in the memory means 50 used in conjunction with coincidence detector 76, or in  
16 response to alert instructions or caller identifying data received as part of the message  
17 from receiving means 12 via line 47.

18  
19 If the user responds to the message alert, the user has the ability to hear the  
20 message in real time, depending upon the position of mode switch 60, or has the  
21 ability to hear only the associated caller identifying data until the play key 56 is  
22 depressed again. In another alternative embodiment, calls received which are  
23 determined to be confidential by the coincidence detector 76 and memory means  
24 comparing against the received caller identifying data can be inhibited from playback  
25 until such time as a personal identification code is entered by the user using the  
26 keyboard 53 or display means 77 for example. In another embodiment, the message  
27 received could include a code with the message data that creates a confidential  
28 condition such that a personal identification code must be entered before the particular  
29 message can be annunciated. Alternatively, the user could require all messages  
30 received to require entry of a personal identification code. Such security features are  
31 particularly useful in case the user wishes to prevent other persons in the immediate

1 vicinity from inadvertently hearing confidential messages, or in the case where the  
2 paging receiver is lost.

3  
4 If the mode switch is in the normal mode, upon receipt of a voice message, the  
5 user hears an alert followed by the voice message. Simultaneously, the message is  
6 stored into a storage area in the memory means 50, depending upon the bit rate of  
7 the CODEC 38.

8  
9 Referring to Figure 1c, a second embodiment of the present invention illustrates  
10 a sound input means 81 which may have an integrated microphone 82 or a releasably  
11 connectable sound input means 83. This allows sound data such as spoken voice or  
12 personal computer files such as .WAV files to be uploaded to the paging receiver  
13 device 10 for storage in the memory means 50 for alert annunciation. Such custom  
14 annunciations could be generated in response to particular caller identifying data  
15 received as determined by the coincidence detector 76 and prestored data records  
16 in memory means 50, or could be stored in code memory for default alert annunciation  
17 signals upon receipt of a message or a particular condition within the paging receiver  
18 10 controlled by microcomputer 26. Input switch module 42 includes a "RECORD"  
19 function key 79 which can be used to start recording or uploading of any sound  
20 through the sound input means 81 when the paging receiver 10 is in a sound  
21 recording/uploading mode.

22  
23 In addition, Figure 1c includes a DTMF tone decoder means 80 which can  
24 decode DTMF audio signals received as part of the message data from receiving  
25 means 12. The audio signals received can be supplied to the decoder means 80 and  
26 corresponding numeric textual data can be displayed on the display means 77 or  
27 supplied to a coincidence detector 76 for comparison against prestored data in  
28 memory means 50. Corresponding matching data records can then be annunciated  
29 and/or displayed prior to annunciation of the voice message.

1 In Figure 1d is shown an autodialing type paging receiver in which DTMF data  
2 received can be applied to a DTMF tone decoder and text to speech generator in a  
3 similar manner as described hereinbefore. In this embodiment, the inventions herein  
4 are especially useful in that a display member is not necessary for the user to  
5 determine the identity of the calling party as the telephone number may be  
6 annunciated. Such a device may be used in a stored voice paging system, in which  
7 DTMF entries are manually entered in conjunction with a voice message for  
8 transmission to an autodialing type paging receiver. The DTMF tones can be  
9 annunciated as voice representations of DTMF digits received. For example, if the  
10 DTMF tone detector receives the dual tone frequencies of 1209 Hz and 697 Hz then  
11 the text to speech generator will receive instructions from the tone decoder and the  
12 synthesized voice annunciation "ONE" will be heard. Different corresponding synthetic  
13 voice messages can be stored in ROM in the text to speech generator for each of the  
14 various DTMF tone combinations and generated in response to a depression of the  
15 "SPEAK" button or automatically generated in response to receipt of a message when  
16 decoded by the DTMF tone decoder. The DTMF signals received may be stored in  
17 a memory as DTMF audio signals for playback through a sound signal generator and  
18 speaker or may be converted to digital representations of the DTMF signals for  
19 application to a DTMF generator (not shown) for later redial.

20  
21 In one preferred embodiment, textual caller identifying data such as name and  
22 telephone number information is received by the receiving means along with any  
23 associated voice message in a stored voice paging receiver. The microprocessor can  
24 apply the received caller id data to a text to speech unit and display means for  
25 annunciation and display. Each subsequent message received can be stored in a  
26 memory means contained in a detachable memory as described in Figure 5a. The  
27 detachable memory means may be a PCMCIA memory card that may allow transfer  
28 of voice messages received from a voice mail center for subsequent archiving in a  
29 personal computer or the like.



1           The stored voice paging receiver can also have a detachable keyboard or other  
2 input means to allow for entry of memory records that can be used by a coincidence  
3 detector within the pager, as in a copending application . Upon receipt of caller  
4 identifying data, the coincidence detector can compare the caller identifying data  
5 against prestored memory records to annunciate or display associated caller  
6 identifying data prior to annunciation of the voice message received.

7  
8           In Figure 3a is shown the prior art method of receiving and transmitting a voice  
9 message to a stored voice paging receiver. In Figure 3b is shown an improvement  
10 over the prior art method in which caller identifying data is received, stored and  
11 associated with a voice message for transmittal to a stored voice paging receiver.

12  
13           In Figures 4a through 4e are shown various alternative embodiments in which  
14 caller id data can be utilized within a stored voice paging receiver.

15  
16           For example, in Figure 4a when a stored voice paging receiver receives a  
17 message, a coincidence detector can generate a prestored audio alert. First, the  
18 called party enters textual data and a corresponding audio announcement into the  
19 pager in advance. In this case, the number 555-1212 could be entered by a data  
20 entry means into the pager, and a voice entry such as "home office" could be spoken  
21 into a sound input accessory, for storage in the pager memory. If the caller id data  
22 such as 555-1212 were received, a coincidence detector would determine a match  
23 with the previously entered number and the previously entered audio alert "home  
24 office" would be heard by the called party. Upon depression of a play key, the voice  
25 message could be heard. "unknown caller", the caller id data could be displayed and  
26 upon depression of a play button, the voice message could then be heard.

27  
28           In Figure 4b is shown another alternative embodiment in which a voice pager  
29 allows a called party to associate certain pin numbers with calling parties. For  
30 example, some callers may typically be of a personal or confidential nature. The  
31 playback of messages from these callers may require entry of a PIN code prior to

1 annunciation of any message. In this case, a coincidence detector could be  
2 employed which analyzes caller id data received and compares against a prestored  
3 caller list. When a match is determined, particular caller messages would not be heard  
4 until the proper PIN code was entered by the calling party. When the correct code  
5 was entered, the caller id data could be annunciated or displayed until such time as  
6 the play key was depressed. Of course, the caller id data could be inhibited from  
7 display or annunciation until such time as the proper pin code was entered by the  
8 called party. In this case then, a default alert signal could be generated in response  
9 to receipt of a message that did not indicate the identity of the calling party until the  
10 pin code was entered properly. Alternatively, the prompt for the pin code entry could  
11 be generated by the pager after the receipt, display and annunciation of caller id data  
12 but prior to annunciation of the voice message from the calling party.

13  
14 In Figure 4c is shown another alternative embodiment in which a voice pager  
15 receives DTMF audio signals along with a voice message. The voice pager could  
16 distinguish DTMF signals from the voice message data by use of a DTMF tone  
17 decoder means within the pager. The DTMF tone decoder could generate a  
18 corresponding textual or synthesized voice alert corresponding to the caller id of the  
19 calling party. In addition, the decoded DTMF signals could be employed with a  
20 coincidence detector to display or annunciate previously stored matching data records  
21 as previously described in Figure 4a. Further, the received audio DTMF signals  
22 received could be used in place of a more conventional DTMF generator to generate  
23 a corresponding dialing signal for call back to the calling party.

24  
25 In Figure 4d is shown another alternative embodiment in which a voice pager  
26 can utilize a text-to-speech unit within the pager to annunciate textual caller identifying  
27 data received.

28  
29 In Figure 4e is shown another alternative embodiment in which a stored voice  
30 pager can operate in one of three different modes: Announce mode in which a  
31 coincidence detector is employed against all caller id data received automatically upon

1 receipt; silent mode in which a coincidence detector is employed against all caller id  
2 data received only upon depression of a play key; and a broadcast mode in which  
3 caller id data is displayed and/or annunciated and the voice data is annunciated  
4 automatically, without use of any coincidence detector. For example upon receipt of  
5 a message when in the announce mode, a coincidence detector could be employed  
6 before an alert signal was generated. Upon detection or non detection of a matching  
7 record, the appropriate alert signal would be generated and the unit would play the  
8 associated voice message upon depression of the play key. Upon receipt of a  
9 message when in silent mode, the caller id data could be displayed but not  
10 annunciated. When the called party scrolled through the messages received by  
11 viewing the display of various caller id data associated with voice messages, he could  
12 then press a play key and the coincidence detector could generate an appropriate  
13 alert signal. If the play key was depressed again, the voice message could be heard  
14 by the called party. Alternatively, a single depression of the play key could cause the  
15 annunciation of the caller id data and subsequent annunciation of the voice message.  
16 If the pager were in broadcast mode, the caller id data could be displayed and the  
17 voice message received would be broadcast to be heard by the called party.

18  
19 In Figure 5a, caller identifying data such as name and number data, particular  
20 voice or sound data for message alerting, pin code data, iconographic data such as  
21 logos or meaningful graphic images, photo images of a calling party or other data is  
22 stored in a memory means that is integral to or detachable from the paging receiver.  
23 This data could be transferred from a PCMCIA memory card attached to the pager,  
24 or an integrated memory within the pager that received data from an input means such  
25 as an infrared, serial or parallel connection with another device, or a data input means  
26 integrated in the pager such as a touch screen, sound input accessory, keyboard, or  
27 some other means.

28  
29 In Figure 5b is shown one embodiment of a display member (8) within a stored  
30 voice paging receiver (7) in which caller identifying information can be scrolled through  
31 prior to selecting a particular message for annunciation. Such a display could be of

1 the type known as a touch screen which allowed also for programming of softkeys for  
2 various functions to be performed such as scrolling, data entry, message selection and  
3 the like as for example in . The particular urgency of a message received could be  
4 indicated on such a display by a flashing iconographic indicator (1), the caller id name  
5 and number data (4) could be displayed, the duration of the voice message received  
6 could be shown (3) and the time the message was received could be displayed (2).  
7 In such cases where blocked caller id indicators were received, default message such  
8 as "blocked" (6) or "unknown" could be displayed.

9  
10 In Figure 5c is shown a caller id memory address register in which caller id data  
11 associated with voice messages received can be stored for later recall and display in  
12 a stored voice pager. This memory for the caller id data could be contiguous or  
13 separate from the memory used for the voice messages received and could be applied  
14 to a display as described previously. The voice message stored in memory can be  
15 annunciated after selection of a displayed caller identifying record by the called party.

16  
17 Additional art incorporated herein by reference includes the following:

18  
19 Brother Intellifax 780 MC Owners manual  
20



21 **Figure 11** provides a simplified block diagram of a telephone network, in  
22 accordance with the prior art, which will be utilized to describe some fundamentals of  
23 telephony which may be necessary to understand the present invention. As is shown,  
24 telephone network **9** can be utilized to allow call-originator **11** to utilize telephone **13**  
25 to place a telephone call to call-receiver **15**, which utilizes telephone **17** to receive such  
26 a call. Fairly elaborate switching networks **19** and **21** connect call-originator **11** and  
27 call-originator **15** to central office **23** of telephone network **9**.

28  
29 In central office **23**, there is a source of electrical current, identified as talk  
30 battery **25**, which is utilized to determine whether or not a particular telephone (i.e.,  
31 telephone **13** or **15**) is in the "on-hook" or "off-hook" condition. If the handset of a

1 particular telephone is lifted from the cradle of the telephone, the telephone goes from  
2 an on-hook condition to an off-hook condition. When a particular telephone is in an  
3 off-hook condition, dial tone generator **27** at central office **23** of telephone network **9**  
4 is utilized to generate an audible dial tone which indicates to the telephone operator  
5 that an outgoing call may be initiated. For example, call-originator **11** may lift the  
6 handset from the cradle of telephone **13**, and receive an audible dial tone through the  
7 operation of dial tone generator **27** and central office **23**.

8  
9 After call-originator **11** dials the telephone number of call-receiver **15**, ring  
10 generator **29** at central office **23** generates a plurality of ring signals which are sent  
11 through switching network **21** to telephone **17** to alert call-receiver **15** that a call is  
12 incoming. Once call-receiver **15** lifts his or her handset off of the cradle of telephone  
13 **17**, voice path **31** is established between call-originator **11** and call-receiver **15**.

14  
15 In accordance with current Bell standards, caller-identification information may  
16 be transmitted, automatically, between call-originator **11** and call-receiver **15**, through  
17 telephone network **9**, in a manner which will be described below with reference to  
18 **Figures 12a, 12b, and 12c**. In the United States of America, in accordance with the  
19 Bellcore Specification No. 220, the transmission must occur between the first and  
20 second rings. In **Figure 12a**, such caller-identification information signals transmitted  
21 to call-receiver **15** are depicted in simplified form, with caller-identification information  
22 **39** occurring between first ring **35** and second ring **37**. The Bellcore Specification  
23 requires that caller-identification information **39** occur at least 500 milliseconds after  
24 first ring **35** ceases. Thus, the signal which represents the caller-identification  
25 information will begin transmission one-half of one second, or longer, after the  
26 termination of first ring **35**. Caller-identification information **39** is transmitted serially,  
27 utilizing a frequency-shift-keying technique, which is well known in the prior art.

28  
29 The Bellcore Specification also requires that the transmission of caller-  
30 identification information **39** end at least 427 milliseconds prior to the commencement  
31 of second ring **37**. Typically, there is a four second interval between first ring **35** and

1 second ring **37**, so a significant amount of time is available for the communication of  
2 caller-identification information. Altogether, there is available a period of 2,570  
3 milliseconds for the transmission of caller-identification information, not including  
4 pauses required by the Bellcore Specification (such pauses or periods of silence are  
5 required at the beginning and end of the message). At 1,200 baud, this message  
6 interval is sufficient to transmit 3,084 bits, or 308 bytes.

7  
8 The blocks of data which make-up the caller-identification information **39** is set  
9 forth in block diagram form in **Figure 12b**. The first component of the caller-  
10 identification information is a synchronization signal **41** which comprises a channel  
11 seizure signal having a duration of 250 milliseconds of frequency-shift-keying encoding  
12 of a bit pattern of alternating zeros and ones. Such a synchronization signal is utilized  
13 to provide a recognizable pattern to alert applicable caller-identification decoding  
14 equipment that caller-identification information follows. Pre-message pause **43** follows  
15 synchronization signal **41**, and has a duration of 150 milliseconds, plus or minus 25  
16 milliseconds. The purpose of such a pre-message pause **43** is to condition the  
17 receiver for the data which follows.

18  
19 Next, message-type identifier **45** follows synchronization signal **41**. Message  
20 type identifier **45** is typically one byte of data which identifies the type of caller-  
21 identification message which is being sent. There are two basic types of caller-  
22 identification messages, including: (1) only numeric data, which identifies the  
23 telephone number for the source of the telephone call; and (2) numeric data, which  
24 identifies a telephone number for the source of the telephone call, along with  
25 hexadecimal representation of alphabetic characters that contain the directory name  
26 associated with the telephone number of the source telephone. In accordance with  
27 the Bellcore Standard, 04 hexadecimal identifies a single message caller-identification  
28 message, while 80 hexadecimal identifies a caller-identification message which includes  
29 both a telephone number and a name.

1           Next, message byte count **47** provides an indication of the total length of the  
2 caller-identification information. This is important because the directory name  
3 associated with the source telephone number will have a different length for each  
4 particular name.

5  
6           Thereafter, sub-message type **49** identifies the type of submessage which is  
7 transmitted with the caller-identification information. Sub-message link **51** identifies the  
8 length of the sub-message which follows.

9  
10          Message **53** consists of information which is described in more detail below with  
11 respect to **Figure 12c**. Message **53** is followed by checksum byte **55** which, in  
12 accordance with the prior art techniques, provides a checksum total to ensure that  
13 data received has not been lost or altered in any way during the transmission. The  
14 receiving unit of a caller-identification decoder generates a checksum in response to  
15 the entire caller-identification bit stream, and thereafter compares this checksum with  
16 checksum byte **55**. If these checksums match, then no bits were lost in the  
17 transmission; however, if the checksum generated by the caller-identification decoder  
18 does not match checksum byte **55** received at the decoder, then one or more data  
19 bits may have been lost in the transmission, and the information may be unreliable or  
20 unusable.

21  
22          The final component of a caller-identification message is post-message pause  
23 **57**, which is a quiescent period prior to second ring **37** of **Figure 12a**.

24  
25          With reference now to **Figure 12c**, message **53** will be described in greater  
26 detail. The first eight bits of the message include month bits "MM", day bits "DD", hour  
27 bits "HH", and minute bits "MM". These eight bits provide the month and date, along  
28 with the hour and minute, in military time, of the telephone call. Note that no  
29 information is provided regarding the year.

1           The next portion of message 53 is either (1) a ten digit telephone number, or  
2 (2) a single digit which identifies that caller-identification information is either (a) not  
3 available, or (b) has been blocked to maintain the caller's privacy.  
4

5           If caller-identification information is not available, the ASCII character "0" is  
6 transmitted. If the caller-identification information has been blocked for reasons of  
7 privacy, the character P is transmitted. However, if the caller-identification information  
8 is neither unavailable nor blocked, then a ten digit bit stream follows. The first three  
9 bits, "AAA" identify the area code; the next three bits, "PPP", identifying the prefix; and  
10 the final four bits, "EEEE", identify the exchange. For example, if the source phone  
11 number is 702-731-1113, then AAA = 702, PPP = 731, and EEEE = 1113.  
12

13           The next portion of message 53 is caller-identification information which  
14 identifies the name associated with the particular preceding telephone number. If this  
15 information is unavailable, a single character "0" is provided. If this information is  
16 blocked for reasons of privacy, a single character "P" is provided. However, if this  
17 information is both available and not blocked, a multi-bit string follows which sets forth  
18 a name associated with the particular preceding telephone number (for example, "John  
19 Doe").  
20

21           Therefore, considered broadly, caller-identification information may be solely  
22 data which identifies a telephone number associated with the telephone unit utilized  
23 to place a call, or the telephone number associated with the telephone unit utilized to  
24 place the call in combination with alphabetic characters identifying a name associated  
25 with that particular number in a telephone directory (i.e., a telephone director data  
26 base). In either event, whether the directory name is provided or not, this information  
27 can be considered to be the "caller-identification information." The particular details  
28 of the caller-identification standards in the United State of America are set forth in the  
29 publications of the Bell Communications Research Laboratories, which are identified  
30 as "Bellcore", and include (1) Technical Reference No. TR-TSY-00032, issued  
31 November 1, 1986, and entitled "CLASS(sm) Feature: Bulk Calling Line Information";



1 (2) Technical Reference No. TR-TSY-000030, issued January 1, 1990, entitled  
2 "CLASS(sm) Feature: Calling Number Delivery"; and (3) Technical Reference No.  
3 TANWT-001188, issued March 1, 1991, entitled "CLASS(sm) Calling Name Delivery and  
4 Related Features Generic Requirements"; all of which are incorporated herewith by  
5 reference as if fully set forth.  
6

7 **Figure 13** depicts one embodiment of the present invention wherein numeric  
8 paging network **61** is utilized to receive caller-identification information via interaction  
9 with telephone network **9** in response to call-originator **11** communicating through  
10 telephone network **9** with central office **59** of numeric paging network **61**. In this  
11 configuration, numeric paging network **61** may be utilized to transmit the numeric  
12 portions of caller-identification information, and not the alphanumeric portions. **Figure**  
13 **13** includes telephone network **9**, which includes components identical to those  
14 discussed above in connection with **Figure 11**, with the only difference being that a  
15 page request telephone call is received by call receiver **15**, which is located within  
16 numeric paging network central office **59**. Between the first and second rings received  
17 by call receiver **15**, the caller-identification information is routed through telephone **17**  
18 to decoder **63**.  
19

20 Decoder **63** comprises a conventional caller-identification decoder capable of  
21 receiving the frequency-shift-keyed caller-identification signal, and decoding it into a  
22 bit stream representative of the information described above in connection with  
23 **Figures 12b** and **12c**. The portion of information corresponding to the telephone  
24 number of particular telephone **13** being utilized by call originator **11** is provided as an  
25 input to decoder **63**. Additionally, telephone **17** is utilized to receive any optional  
26 numeric message which is input by call-originator **11** and transmitted over voice path  
27 **31** during the time interval provided.  
28

29 The decoded numeric information which corresponds to the telephone number  
30 of the telephone utilized by call-originator **11**, and any numeric message input by call-  
31 originator **11**, are assembled in message buffer **65**, which pushes the serial bit stream

1 to transmitter **67** in accordance with a predefined protocol. The present invention may  
2 utilize the predefined communication protocol identified as the Post Office Code  
3 Standardization Advisory Group (POCSAG) code. Such a code comports with the  
4 formats provided by the International Committee CCIR, which has standardized  
5 message coding for radio frequency transmissions. Both the POCSAG code and  
6 CCIR standards are well known by those skilled in the art, and both are incorporated  
7 herein by reference as if fully set forth, but are not essential to the main concepts of  
8 the present invention.  
9

10 Transmitter **67** provides a radio frequency communication link **69** which  
11 communicates information from numeric paging network central office **59** to personal  
12 communication device **71**. Personal communications device **61** may be a receive-only  
13 device, such as a paging device, or a more sophisticated bi-directional communication  
14 device, such as a personal communication device or personal digital assistant, such  
15 as the personal digital assistant sold under the trademark "Mackintosh Newton" by  
16 Apple Computer, or the product sold by AT&T under the trademark "EO". Preferably,  
17 personal communication device **71** at least includes display **73**, which is utilized to  
18 display information based, at least in-part, upon information contained within a  
19 database resident within personal communication device **71**, or in-part upon  
20 information transmitted over radio frequency communication link **69** from central office  
21 **59** of numeric paging network **61**.  
22

23 **Figure 14** provides a block diagram representation of another embodiment of  
24 the present invention wherein alphanumeric paging network **75** is utilized to receive  
25 caller-identification information. Such caller-identification information which may be  
26 received includes numeric information corresponding to the telephone number of  
27 telephone **13** utilized by call originator **11** to engage alphanumeric paging network **75**,  
28 and alphanumeric text which identifies the "entity" listed in a telephone directory (i.e.,  
29 a database) as the owner of the particular telephone number assigned to telephone  
30 **13**. Call-receiver **15** receives the incoming call through switching network **21** on behalf

1 of alphanumeric paging network **75**. Call-receiver **15** is located within alphanumeric  
2 paging network central office **77**.

3  
4 The caller-identification information is routed from telephone **17** to decoder **79**,  
5 where it is converted from the frequency-shift-key format transmitted within telephone  
6 network **9**, to an acceptable binary or hexadecimal format. Such decoded caller-  
7 identification information includes numeric caller-identification information which  
8 corresponds to telephone **13** utilized by call-originator **11** to engage alphanumeric  
9 paging network **75**, as well as alphanumeric textual information which identifies the  
10 "entity", as listed within the telephone directory database, which has ownership of that  
11 particular telephone number, along with other additional formatting information which  
12 was described above in connection with **Figures 12a, 12b, and 12c**.

13  
14 This decoded caller-identification information is pushed from decoder **79** to  
15 message buffer **81**, and may also be provided to automated checking routine **83**.  
16 Automated checking routine **83** receives caller-identification information and formulates  
17 a textual or synthesized voice query, which may then be utilized to communicate with  
18 call-originator **11** to verify the telephone number for telephone **13** (which was derived  
19 from the caller-identification information) as well as the "entity" identity (which was also  
20 derived from the caller-identification information). The query may include the following  
21 questions:

22  
23 (1) The caller-identification information provided to us through the telephone  
24 network indicates that the telephone number from which you are placing this call is  
25 AAA-PPP-EEEE; please depress your telephone key pad number "1" if this information  
26 is correct, or depress telephone key pad "2" if this information is incorrect.

27  
28 (2) Your previous response has indicated to us that the telephone number  
29 provided through the caller-identification is incorrect. Please enter your correct  
30 telephone number at this time beginning with the area code.

1           (3)     The caller-identification information provided to us through the telephone  
2 network indicates that this telephone number is assigned to "NNNNNNNN"; please  
3 depress "1" if this information is correct. If this information is not correct, please hold  
4 for an operator.

5  
6           (4)     Please stand by for an operator if you desire to leave a detailed  
7 message; otherwise, please hang-up and your page will be directed to the intended  
8 recipient which you should now identify by depressing the keys on your telephone key  
9 pad, with the area code being entered first.

10  
11           (5)     If no detailed message is desired, hang-up and your page will be directed  
12 to area code "AAA", telephone number "PPP-EEEE". Thank you.

13  
14           After this automated verification of the caller-identification number occurs,  
15 human operator **85** may be made available to call-originator **11** to take a detailed  
16 alphanumeric textual message. Human operator **85** keys a particular message into  
17 message buffer **81** prior to transmission of the message by transmitter **87**, via radio  
18 frequency communication link **89**, to remotely located personal communication device  
19 **91** which includes display **93**. Upon receipt of the page, personal communication  
20 device **91** generates information for display in display **93** based at least in part on at  
21 least one of: (1) information communicated via radio frequency communication link  
22 **89**; or (2) information contained within a database maintained within personal  
23 communication device **91**.

24  
25           While **Figures 13** and **14** have been described with reference to a numeric  
26 paging network and an alphanumeric paging network, the present invention may be  
27 utilized with an alphanumeric paging network which allows for communication of a  
28 variety of page-originator generated messages, in a variety of formats. Such  
29 messages may be provided to the portable personal communication device in a variety  
30 of formats, including:

1           (1)     textual information which include either numeric only, or alphanumeric  
2 data;

3  
4           (2)     digitized voice or audio information which may be communicated in  
5 analog form through the telephone network to the central office of the alphanumeric  
6 paging network, where the information is then digitized, and transmitted in a digital  
7 format which, upon reception, may be reconstructed to define an analog voice or  
8 audio signal which drives an audio output device resident in the personal  
9 communication device; or

10  
11          (3)     digitized image information, such as a video image or an iconographic  
12 representation of information, which may be transmitted over the voice channel of the  
13 telephone network and received at the central office of the alphanumeric paging  
14 network, where it is then digitized, and transmitted to the remotely located personal  
15 communication device, where the digital information is reconstructed into an image  
16 which may be displayed on a display resident in the personal communication device.

17  
18           Given this variety of message-format inputs, the personal communication device  
19 can provide an equally impressive array of display options. Textual input (including  
20 numeric and alphanumeric characters) can be displayed in a conventional manner on  
21 a simple and relatively inexpensive alphanumeric LCD display. Additionally, text which  
22 is provided as input to the personal communication device via the radio frequency  
23 communication link, may be utilized with a voice synthesizer to provide synthesized  
24 voice as an output from an audio output device resident in, or coupled to, the personal  
25 communication device.

26  
27           Alternatively, an alphanumeric or numeric input supplied to the personal  
28 communication device may be utilized to recall one of a plurality of prestored audio  
29 output messages. For example, a table may be provided which identifies particular  
30 alphanumeric codes as corresponding to particular audio output messages. The  
31 binary characters "1111" may correspond to the audio output message "phone home

1 now". Alternatively, a different code, such as "001," may correspond to the audio  
2 output message "phone your office now". The prerecorded and predetermined audio  
3 output messages may define a plurality of messages which alert the page-receiving  
4 communicant that a page has been received from a particular source, and indicating  
5 a particular urgency or requesting a level of diligence in response thereto.  
6

7 Of course, as another option, digitized audio or voice data may be reconstituted  
8 into analog format to provide an audio output corresponding almost directly to the  
9 audio input provided by the page-originating communicant over the telephone lines to  
10 the central office of the paging network.  
11

12 Digitized images may also be transmitted to the personal communication device  
13 in this manner for display on a more elaborate display, such as a personal computer-  
14 type display. Finally, digitized audio may be provided as an input to the personal  
15 communication device, which, in turn, may be utilized to generate a combination of  
16 signals, which may include an audible signal, or a preselected image, such as an icon,  
17 which may be placed on the display.  
18

19 **Figure 15** provides one example of the utilization of a numeric message code,  
20 which is input at the personal communication device, to generate a textual message  
21 which provides, to the page-receiving communicant, information which allows him or  
22 her to respond in an appropriate manner to the page. As is shown in **Figure 15**, the  
23 message code number column on the left corresponds to a textual message code on  
24 the right. Receipt of the "\*1" message code results in the display of the message "call  
25 when you return" on the personal communication device. The receipt of the message  
26 code "\*2" results in the display of the textual message "voice mail received" on the  
27 personal communication device. Receipt of the "\*3" message code results in the  
28 display of the textual message "fax mail received" on the personal communication  
29 device. Receipt of the "\*4" message code results in the display of the textual message  
30 "electronic mail received" on the personal communication device. Receipt of the "\*5"  
31 message code at the personal communication device results in the display of the

1 textual message "image data received". Receipt of the "\*6" message code results in  
2 the display of the textual message "other data received" on the personal  
3 communication device. Finally, receipt of the "\*911" message code at the personal  
4 communication device results in the display of the textual message "call immediately".  
5

6 Of course, other various preselected and predefined textual messages are  
7 possible. To facilitate the use of this system, the paging network may provide a  
8 synthesized-voice and keypad driven exchange between the call-originating  
9 communicant and the central office of the paging network. Such an interface may be  
10 utilized until the various page-originating communicants learn one or more of the most  
11 useful message codes. After such message codes are learned, a user may thereafter  
12 bypass the synthesized-voice menu. Preferably, the information provided to the page-  
13 receiving communicant is stored in memory within the personal communication device  
14 for review at a later time. Typically, the personal communication device includes  
15 memory buffers sufficient to hold a selected number of messages received via the  
16 paging network, and other corresponding data.  
17

18 **Figure 16** provides a view of one way in which the data received from the  
19 page-originating communicant may be organized. Such organized data may be stored  
20 at either the central office of the paging network or within the memory allocated for  
21 such purpose within the personal communication device. As illustrated, a plurality of  
22 locations are provided for storing caller-identification information (i.e., locations in the  
23 first column), DTMF data which may be entered by the page-originating communicant  
24 by utilizing the telephone handset (the second column), and caller message data  
25 which may be provided by the page-originating communicant through utilization of a  
26 variety of massaging techniques, but in this example, an alphanumeric massaging  
27 technique, such as that discussed above with respect to **Figure 15**.  
28

29 **Figures 17, 18, 19a, 19b, and 19c** provide views of three alternative physical  
30 configurations for the personal communication device in accordance with the present  
31 invention. Personal communication device **101** of **Figure 17** allows for two-way

1 communication with the paging network. Personal communication device **101** includes  
2 display **103**, which is preferably a display of the type utilized in portable personal  
3 computers, such as notebook computers. Display **103** may be utilized to display  
4 information, such as caller-identification information **105**. Caller-identification  
5 information **105** may include an alphabetic identification of the name associated with  
6 the telephone number transmitted with the caller-identification information, or may  
7 include optional message **107** input by the page-originating communicant during the  
8 request for a page via the telephone network.

9  
10 As is shown, other information **109**, such as an address associated with the  
11 page-initiating communicant **105**, may be retrieved from a database in the memory of  
12 the personal communication device and displayed along with the caller-identification  
13 information on display **103**.

14  
15 Personal communication device **101** of **Figure 17** also includes keyboard **111**  
16 and graphical pointing device **113**, such as a touch pen, which may be utilized to  
17 select icons, menu buttons, or other items displayed in a graphical user interface.  
18 Preferably, personal communication device **101** allows two-way communication, and  
19 includes a cellular link to the telephone network and/or paging network. Additionally,  
20 data card **115** may be provided to load personal communication device **101** with a  
21 preconfigured database containing information pertaining to parties with which frequent  
22 communication may occur.

23  
24 **Figure 18** provides a view of an alternative personal communication device **117**,  
25 which allows only one-way communication; personal communication device **117** may  
26 receive information from the paging network, but may not directly originate an  
27 outgoing communication with the telephone network, or with the paging network. As  
28 is shown, personal communication device **117** includes display **119**, which may display  
29 identification **121** of the page-originating communicant, along with his or her address.  
30 Telephone field **123** is also provided for displaying a telephone number at which the  
31 page-originating communicant may be reached. Furthermore, short message **125** may



1 be provided to indicate either (1) the type of information which has been received at  
2 the paging network, or (2) the degree of urgency attached to the particular information  
3 received.  
4

5 Data card **127** may be utilized to load personal communication device **117** with  
6 additional database information. In the preferred embodiment of the present invention,  
7 the information displayed in display **119** is based at least in-part upon caller-  
8 identification information, and at least in-part upon information recalled from the  
9 database resident in the memory of personal communication device **117** or within data  
10 card **127**. As is shown in **Figure 18**, keyboard **129** is provided to allow the page-  
11 receiving communicant a means to enter or manipulate data within the database.  
12

13 A third, and still different, embodiment of the present invention is depicted in  
14 **Figures 19a, 19b, and 19c**. **Figure 19a** provides a view of the bottom portion of  
15 personal communication device **131**. Note that audio output device **133** is provided.  
16 Mechanical coupler **135** provides a means for acoustically coupling personal  
17 communication device **131** to any telephone equipment, particularly the mouthpiece  
18 of a telephone handset, against which audio output device **133** is disposed.  
19

20 **Figure 19b** provides a side view of personal communication device **131** of  
21 **Figure 19a**. Note that power switch **137** is provided to switch the power to personal  
22 communication device **131** off and on.  
23

24 **Figure 19c** provides a view of the top portion of personal communication  
25 device **131**. Display **139** is provided to receive and display numeric data,  
26 alphanumeric data, and images. A plurality of icons **141** are provided about display  
27 **139**, each of which is dedicated for the communication of particular information. For  
28 example, icon **143** is representative of a clock, and may be utilized to indicate to the  
29 page-receiving communicant that time-sensitive information has been communicated  
30 to the paging network. For an alternative example, icon **145**, which depicts a  
31 telephone, is provided to indicate to the page-receiving communicant that a telephone

1 message has been received by the paging network. A variety of other dedicated  
2 iconographic representations are provided about display 139, each of which is  
3 dedicated to communicate particular, predefined information to the page-receiving  
4 communicant pertaining to information deposited at the paging network.

5  
6 The device depicted in **Figures 19a, 19b, and 19c** allows only the receipt of  
7 information from the paging network, and utilizes the dedicated icons to communicate  
8 particular types of information to the page-receiving communicant. This allows the  
9 small display 139 to be utilized for less-routine types of information.

10  
11 **Figure 20** provides a block diagram view of portable communication device  
12 **201**. As is shown, portable communication device **201** includes central processing  
13 unit **203**, which preferably comprises a microprocessor. The microprocessor of central  
14 processing unit **203** interacts with the plurality of hardware and software components.  
15 Key pad input unit **231** communicates with central processing unit **203** to allow for the  
16 operator to depress particular keys on a keyboard thereby inputting data into portable  
17 communication device **201**. Receiver unit **233** is utilized to receive radio frequency  
18 communication from the paging central office. Decoder unit **235** is utilized to decode  
19 radio frequency signals received from receiver unit **233**. Decoder unit **235**  
20 communicates with central processing unit **203** to power-up central processing unit  
21 **203** when a page notification intended for portable communication device **201** is  
22 received at receiver unit **233**. ID-ROM **237** is utilized to record in memory a particular  
23 numeric or alphanumeric identifying information which is provided to code each  
24 particular portable communication device in a paging network so that it is responsive  
25 to a particular radio frequency transmission. ID-ROM **237** records the particular  
26 identification code assigned to that particular communication device.

27  
28 Central processing unit **203** communicates through display buffer **205**, in a  
29 conventional manner, to place numeric data, alphanumeric data, and images, such as  
30 icons, on display unit **207**. Light-emitting-diode **211** is provided to provide a flashing  
31 indication of the receipt of a page. LED driver **209** is positioned intermediate central

1 processing unit **203** and LED **211**, to allow central processing unit **203** to drive LED  
2 **211** in a variety of flashing patterns. Sound-signal generating unit **213** is coupled  
3 between central processing unit **203** and audio output device **215**. Central processing  
4 unit **203** provides binary control signals to sound-signal generating unit **213** which  
5 result in the output of a particular tone, at a particular volume and a particular  
6 frequency. DTMF signal generating unit **217** is coupled between central processing  
7 unit **203** and audio output device **215**. It is utilized, when desired, to generate dialing  
8 tones which may be communicated through audio output device **215** to the  
9 mouthpiece of a telephone to place a call utilizing the telephone network. Buffer **219**  
10 is coupled to central processing unit **203** and DTMF signal generating unit **217**, and  
11 is provided for queuing of DTMF generating signals. Voice processing unit **221** is  
12 coupled to central processing unit **203** to allow the analog-to-digital and digital-to-  
13 analog conversion of speech and other audio input or output.

14  
15 Several housekeeping functional blocks are also provided in the view of **Figure**  
16 **20**. RAM **229** is provided as a memory cache. In the preferred embodiment of the  
17 present invention, a database including a plurality of fields which identify actual or  
18 potential communicants by name, address, and appropriate telephone and facsimile  
19 numbers, is resident within RAM **229**. Character generator **225** communicates with  
20 central processing unit **203** to generate particular alphanumeric characters in response  
21 to commands from central processing unit **203**. MAC/PC download memory **227**  
22 operates a data exchange buffer to allow for the communication of data between  
23 central processing unit **203** and personal computer **239**. Personal computer **239** may  
24 be utilized to store in memory the database which is intermittently downloaded through  
25 MAC/PC download memory **227** for storage in RAM **229**. As is shown in **Figure 20**,  
26 personal computer **239** is coupled in a node mail network which allows for voice mail  
27 service (VMS), fax mail service (FMS), electronic mail service (EMS), paging system  
28 (PS), images, and connection to information services.

29  
30 **Figure 21** provides a flowchart representation of the technique in accordance  
31 with the present invention for communicating information between a page-originating

1 communicant and a page-receiving communicant. The process starts at software  
2 block **251**, wherein the page-originating communicant (user) utilizes the telephone  
3 network to access an automated data entry system. As discussed above, upon  
4 establishment of a voice circuit between the telephone unit utilized by the page-  
5 originating communicant and the paging center, the caller identification information, if  
6 any exists, is automatically transferred to the central office, where it is decoded and  
7 preferably utilized in accordance with software block **255** in a recorded menu  
8 exchange, wherein the information is verified and/or corrected and/or supplemented.  
9

10 In software block **257**, the page-originating communicant enters optional data.  
11 This optional data may be numeric data, alphanumeric data, digitized speech, facsimile  
12 messages, or images. In accordance with software block **259**, the paging system  
13 identifies when the data entry has been completed, and confirms the data entry in  
14 accordance with software block **261**. In accordance with software block **265**, the  
15 paging network verifies the data, preferably by displaying it or otherwise making it  
16 available to the page-originating communicant. In accordance with software block  
17 **263**, the page-originating communicant hangs-up, and then, in accordance with  
18 software block **267**, the data, including the caller-identification information and any  
19 optional or other data attached to the page information, is transmitted via radio  
20 frequency communication link **269** to portable communication device **271**.  
21

22 The most common application of the present invention requires that the page-  
23 originating communicant enter either numeric or alphanumeric data which is identified  
24 with the caller-identification information. Upon receipt by portable communication  
25 device **271**, at least one of either the numeric caller-identification information, or the  
26 alphabetic caller-identification information, or the optional data entered by the page-  
27 originating communicant is compared to one or more data fields in a database which  
28 is maintained within memory (preferably RAM **229** of **Figure 20**) of portable  
29 communication device **271** (of **Figure 21**).  
30

1           **Figure 22** depicts one example of such a database. As shown, there are five  
2 data fields associated with each entry: a telephone number field, a fax number field,  
3 a name field, an "other data" field (preferably utilized for addresses) and a notification  
4 type and intensity field.

5  
6           In one particular embodiment of the present invention, the numeric or  
7 alphanumeric data entered by the page-requesting communicant is compared to an  
8 appropriate data field. For example, if the page-originating communicant entered  
9 numeric telephone data as part of the page request, this numeric telephone data is  
10 compared to numeric data fields which are representative of telephone numbers in  
11 order to determine if one or more matches exist. If a match exists, it is probable that  
12 the page-requesting communicant is the entity identified in an associated data field.  
13 For example, if a telephone number is entered in the page request which corresponds  
14 to the first number in the database, it is highly likely that Mr. Hashimoto, the first name  
15 in the database, is the page-originating communicant.

16  
17           The caller-identification information is also compared with one or more data  
18 fields in the database. In one specific embodiment, numeric telephone data from the  
19 caller-identification information is compared to numeric fields which represent  
20 telephone numbers, in order to determine if one or more matches exists. If no  
21 matches exist, it is highly likely that Mr. Hashimoto is calling from a telephone which  
22 is not ordinarily associated with him. The page-receiving communicant can then  
23 decide to either return the call immediately, or defer it to a later time. In this event, the  
24 page-receiving communicant knows that Mr. Hashimoto is the likely page-originating  
25 communicant, and that he can be reached at this particular time at the number  
26 identified in the caller-identification information. In this manner, a protocol can be  
27 devised which automatically access one or more of: (1) numeric or alphabetic  
28 characters that are located within the caller-identification signal; and/or (2) numeric or  
29 alphanumeric characters entered by the page-originating communicant into one or  
30 more data fields, in order to identify the likely identity of the page-originating

1 communicant, and to further to identify whether the likely page-originating  
2 communicant is calling from a familiar telephone or an unfamiliar telephone.

3  
4 In instances where the caller-identification information fails to produce a match,  
5 the page-receiving communicant may be provided with a particular type of notification  
6 to indicate that a person is contacting him or her, or attempting to contact him or her,  
7 and such a person is not listed within the database at this time. This may prompt the  
8 owner of the personal communication device to utilize a key pad or alternative means  
9 to enter that entity upon return of the telephone call.

10  
11 The notification type field is interesting, insofar as it is user configurable,  
12 allowing the page-receiving communicant to identify a particular type, or subtype, of  
13 paging notification with one or more particular likely communicants. For example, LED  
14 displays from LED 201 (of **Figure 20**) may be utilized to identify work associates, while  
15 audio tones emitted from audio output device 215 (of **Figure 20**) may be utilized to  
16 indicate that friends or family are attempting to notify the page-receiving communicant.

17  
18 Preferably, the user may establish intensity levels or sequence levels for  
19 particular types of page alert notifications. For example, the notation "VI" indicates a  
20 visual indication with a high intensity. In contrast, the notation "BL" may denote a beep  
21 (that is, audio output) of a low intensity. Still, in further contrast, the notation "T" may  
22 identify that, for this particular potential communicant, only textual messages should  
23 be utilized to identify receipt of the page. In this hierarchical structure, the entity which  
24 is assigned the "T" notification type and intensity, is a fairly low priority potential  
25 communicant, while the communicant which has the "VI" notification type and intensity  
26 indicator identified therewith is a relatively high priority communicant. In this manner,  
27 the page-receiving communicant may be able to prioritize his or her return phone call  
28 activities.

1 A variety of mechanisms by which the owner of the portable communication  
2 device may enter data, revise data, or review data are depicted graphically in **Figures**  
3 **23, 24, 25, and 26.**

4  
5 **Figure 23** depicts a portable communication device with a detachable input  
6 interface, such as keyboard **301**, which releasably connects through connector **303**  
7 to paging receiver **307**. Display **305** is also included in paging receiver **307**. Paging  
8 receiver **307** also includes pager operation switches **309**. The owner of this paging  
9 device may selectively releasably connect keyboard **301** to paging receiver **307**, and  
10 then depress one or more keys on keyboard **301** to enter data at a cursor location  
11 which is presented within display **305**. This device stands in sharp contrast with the  
12 device of **Figure 24**, which includes keyboard **311** that is substantially permanently  
13 coupled to paging receiver **313**. Paging receiver **313** also includes display **315**.  
14 Paging receiver **313** preferably includes pager operation switches **317**. The operator  
15 may utilize keyboard **311** to enter or modify data within display **315**. More particularly,  
16 the operator may utilize keyboard **311** to add or modify data contained in the plurality  
17 of fields of the database maintained within the memory of the portable communication  
18 device.

19  
20 **Figure 25** provides yet another alternative embodiment contemplated under the  
21 present invention. As is shown, paging receiver **321** is provided, and can be  
22 selectively and releasably coupled to personal computer **327** via a serial hardwire line,  
23 a parallel hardwire line, an infrared link, or a radio frequency link. Personal computer  
24 **327** may be utilized to create and maintain the database with a plurality of data fields,  
25 including such fields as communicant's name, communicant's telephone number,  
26 communicant's fax number, communicant's address, and a field containing an  
27 operator-selectable notification attribute or type. Such data may be intermittently  
28 transferred between personal computer **327** and paging receiver **321**, and maintained  
29 within a random access memory within paging receiver **321**.

1           Paging receiver **321** includes display **323** and pager operation switches **319**,  
2 which allow for conventional paging functions. In this embodiment, the data contained  
3 within the database of paging receiver **319** is periodically refreshed by the owner by  
4 conducting memory dumps from personal computer **327** to paging receiver **321**.  
5 Upon receipt of a page notification, the caller identification information and/or optional  
6 data input by the page-originating communicant is compared with one or more fields  
7 of the database contained within the memory of paging receiver **321**.  
8

9           **Figure 26** provides a view of yet another alternative embodiment contemplated  
10 in the present invention. In this system, a very inexpensive paging unit, with limited  
11 display capabilities, includes a memory for the receipt of the database with a plurality  
12 of data fields including communicant's names, communicant's phone numbers,  
13 communicant's fax numbers, communicant's addresses, and any user-selected  
14 notification attribute identified to that particular communicant. The communication is  
15 periodically dumped in a methodical fashion from personal computer **329** via wireless  
16 infrared communicator **331** to portable paging receiver **333**.  
17

18           **Figures 27** and **28** provide block diagram views of the software and hardware  
19 components which facilitate the communication of the database between a computing  
20 device, such as a personal computer, and the portable communication device. In  
21 accordance with **Figure 27**, the personal computing device **401** includes operating  
22 system **403**, desktop application programs **405**, data files **407**, and intellect  
23 communication software **409** which is resident in memory within the computing device,  
24 and which is utilized in the transfer of information between computing device **401** and the  
25 portable communication device **413**, which includes download memory **419** which is  
26 adapted to receive the database information. As is shown, the portable  
27 communication device **413** may be connected via either hardware communication link  
28 **411**, local infrared communication **415**, or remote telephone input **417**. In **Figure 28**,  
29 a laptop architecture is displayed for laptop **421**, which includes operating system **423**,  
30 personal information manager **425**, data files **427**, PCMCIA interface **429** and



1 communication software **431** which facilitates the transfer of information from the  
2 memory of the laptop computing device **421** to the portable computing device **433**.

3  
4 **Figure 29** depicts yet another technique for entering and modifying data which  
5 is present within the database present within the memory of the portable  
6 communication device. As is shown, the page-receiving communicant inputs data on  
7 a physical form **435**, which identifies communicant's names, communicant's telephone  
8 numbers, communicant's fax numbers, communicant's addresses, and any associated  
9 notification attribute for that particular communicant. Alternatively, information is  
10 provided via an automated user input request system **439** which preferably utilizes  
11 either a portable computing device, a stationary computing device, or a telephone to  
12 input data which is to be communicated via radio common carrier **439** to paging  
13 transmitter **441**, which communicates via radio frequency communication link **443** to  
14 paging receiver **445**. The techniques for modifying the database are depicted in  
15 flowchart form in **Figure 30**. The process starts at software block **451**, and continues  
16 at software blocks **452**, **453**, and **454**, wherein data is either manually entered or  
17 automatically entered and routed through software block **453**. In accordance with  
18 software block **455**, data is processed at a radio common carrier, and transmitted to  
19 software block **457**, where it is determined whether local programming is required, if  
20 so, the process continues at software block **459**; if not, the process continues at  
21 software block **460**. In either event, data is communicated to portable communication  
22 device **461** for creation, supplementation, or modification of the database contained  
23 in memory in portable communication device **461**. In accordance with the flowchart  
24 of **Figure 30**, software block **465** requires that message code cards be printed, and  
25 delivered in accordance with software block **458** to a dealer or customer. The  
26 software steps associated with the utilization of these code cards is depicted in  
27 flowchart form in **Figure 31**. In accordance with software block **465**, the page  
28 customer receives the printed message card along with the pager at the beginning of  
29 pager service. In accordance with software block **467**, the page customer distributes  
30 the message cards to callers, and instructs them to fill the data fields in the cards. In  
31 the flow of **Figure 31**, the cards are distributed to callers A, B, and C in accordance

1 with software blocks **469**, **471**, **473**. The callers consult their message cards, and  
2 enter the code data, and transmit it through telephone office **477** to radio common  
3 carrier **479**, which forwards it to paging transmitter **41**, which establishes a radio  
4 frequency link with portable communication device **43**.

5  
6 **Figures 32 and 33** depict two types of standardized message code cards. The  
7 card of **Figure 32**, the call-receiving communicant's pager ID number is identified,  
8 along with the telephone number for the paging center. Then, a plurality of numeric  
9 or alphanumeric codes are provided in a field, with an area to the right for providing  
10 numeric or alphanumeric messages which correspond to the numeric or alphanumeric  
11 codes. For example, the numeric value "0" may corresponds to the answer "no", while  
12 the numeric value "1" may correspond to the answer "yes". In the view of **Figure 33**,  
13 an alternative standardized message code card is provided, which provides  
14 alphanumeric or numeric characters with alphabetic textual messages. For example,  
15 the numeric code "11" corresponds to the message "pick up the kids". Additionally,  
16 the potential communicant can enter phone data and fax data in fields which are  
17 dedicated for that purpose. This information is entered on a wide number of cards by  
18 people who are likely to communicate with the paging subscriber. They are mailed in  
19 or entered in by the potential communicants, to form a database which is periodically  
20 communicated to the page receiving apparatus.

21  
22 While the invention has been shown in only one of its forms, it is not thus  
23 limited but is susceptible to various changes and modifications without departing from  
24 the spirit thereof.